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1584

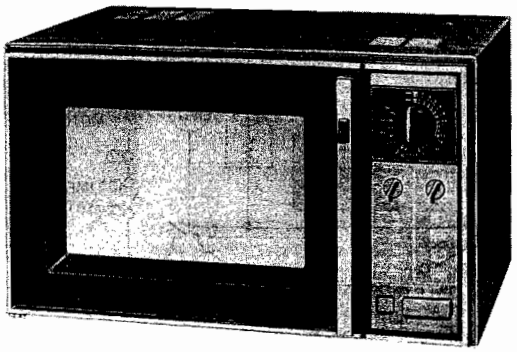
ORDER NBR. M0D-7908-001

Service Manual

Microwave Oven

NE-7720P

This oven can be used for both 50-Hz and 60-Hz areas with a standard 115-120 volt supply. A minor adjustment is necessary to change from 50 to 60 Hz, or vice versa, but only authorized servicemen are qualified to make this frequency change.



NOTE: THIS MANUAL MUST BE USED IN CONJUNCTION WITH THE NE-7720 SERVICE MANUAL.
FOR ADDITIONAL INFORMATION, PLEASE REFER TO MODEL NE-7720

SPECIFICATIONS	
Power Source	115V AC Single Phase: 50/60Hz
Power Requirement	1.42kW (13.0A): 50/60 Hz
High Frequency Output	700W (High Power) 650W to 70W (Variable power range)
Oscillation Frequency	2450MHz,
Magnetron	2M157-M2
Timer	1 Hour (Two Speed) /60Hz, 70min. (Two Speed) /50Hz
Cooling Method	Air Cooling
Approximate Outside Dimensions	24-3/4"(W) x 18-1/2"(D) x 14-3/4"(H) 63.0cm(W) x 47.0cm(D) x 37.5cm(H)
Approximate Oven Cavity Dimensions	15-1/2"(W) x 15-1/2"(D) x 9-1/2"(H) 39.5cm(W) x 39.5cm(D) x 24.0cm(H)
Approximate Weight	73lbs

Specifications subject to change without notice.

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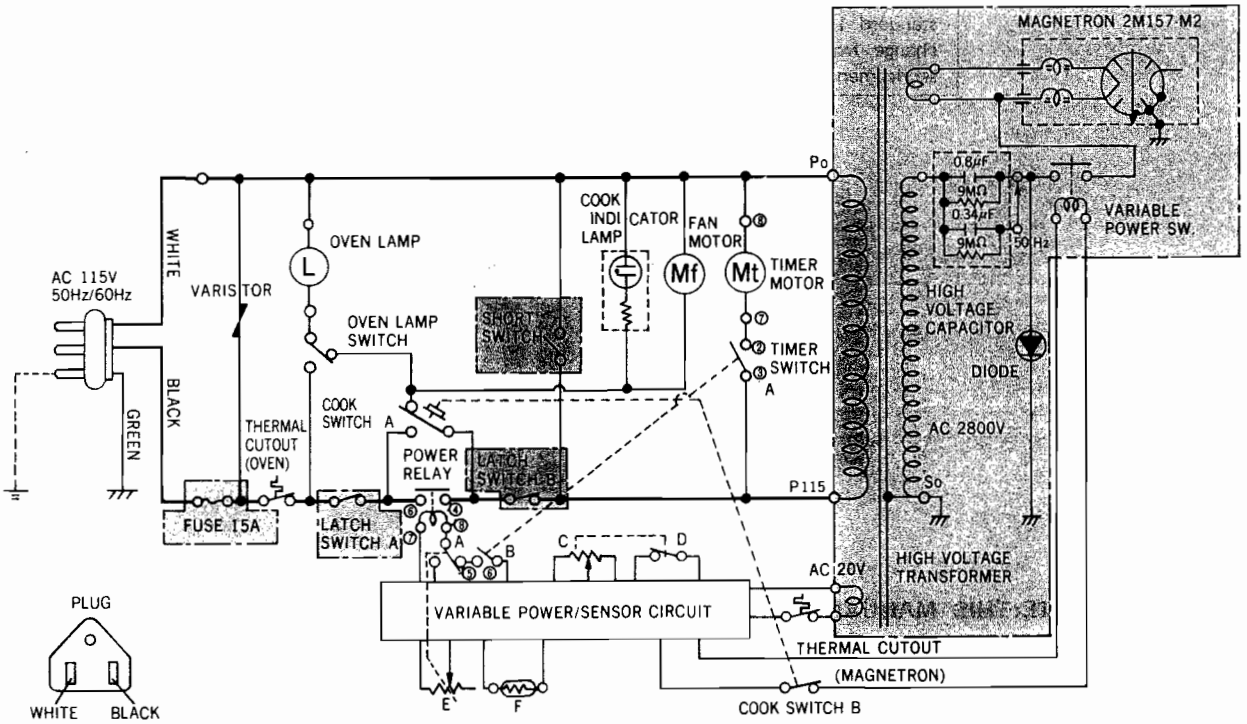
1584

SCHEMATIC DIAGRAM

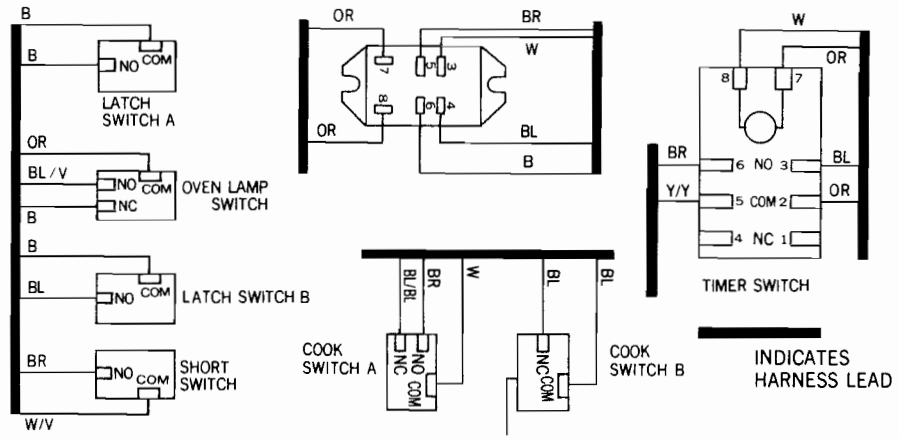
NOTE:1
A:SELECT SWITCH
B:TIMER SWITCH B
C:VARIABLE POWER RESISTOR
D:FULL POWER SWITCH
E:SENSOR RESISTOR
F:SENSOR PROBE
⏚ GROUND ⏚ CHASSIS

NOTE:2
- TIMER SWITCH IS OFF.
- SENSOR PROBE IS INSERTED.
- SELECT SWITCH IS SELECTED TO OFF.
- POWER IS HIGH POWER.
- DOOR IS CLOSED.
- CIRCLED NUMBERS INDICATE TERMINAL NUMBERS.



IMPORTANT SAFETY NOTE:THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM MICROWAVE LEAKAGE, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREA OF THE SCHEMATIC DIAGRAM.

WIRING DIAGRAM



SYMBOL	COLOR
B	BLACK
BL	BLUE
BR	BROWN
OR	ORANGE
R	RED
W	WHITE
Y	YELLOW
V	VIOLET

(Figure 1)

CHANGING THE FREQUENCY OF POWER SUPPLY

CAUTION

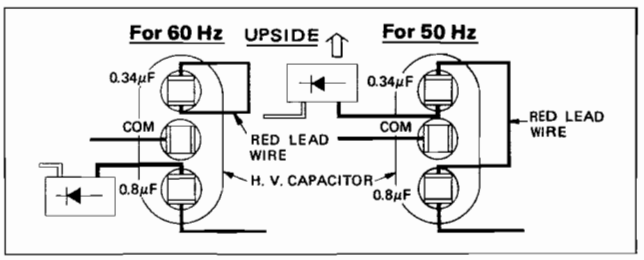
1. Disconnect the plug from wall outlet and discharge the high voltage capacitor.
2. Do not touch any capacitors on the control panel, otherwise you may get an electric shock.
3. If customers use this microwave oven without the changes described below, the high voltage transformer and/or magnetron tube may be damaged.

1. High voltage capacitor wiring

Change the wiring of the high voltage capacitor as shown in figure 2.

2. Change the frequency specification

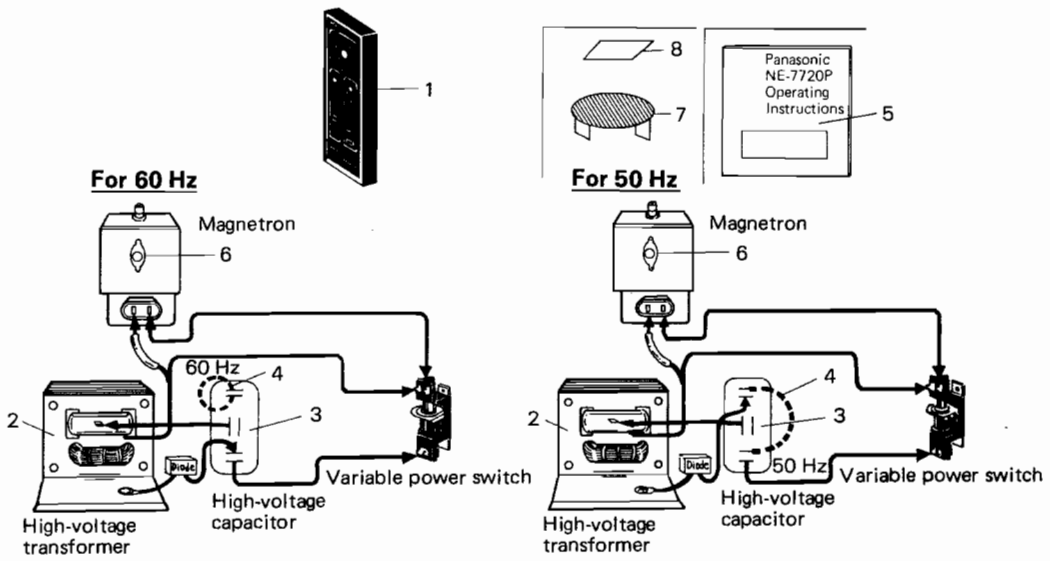
On the identification plate, which is on the back of the oven and user warning label which is attached to the oven's top panel. This will ensure the unit is only used with the frequency you have adjusted.



(Figure 2)

EXPLODED VIEW AND PARTS LIST

This list shows only the parts that differ from model NE-7910.
Please use these Part Numbers for Parts orders.
Components identified by shaded area have special characteristics important for safety, when replacing any of these components use only manufacturer's specified parts.



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
1	ANE800LG00PP	Escutcheon base assembly	1	
2	ANE6005B60PP	High voltage transformer	1	Note 1
3	ANE6090B60PP	High voltage capacitor	1	Note 1
4	ANE0361-C90	Lead wire	1	
5	ANE0003G00PP	Operating instructions	1	
6	ANE6145G10AP	Thermal cutout	1	For magnetron
7	ANE0602B60AP	Warming rack	1	
8	ANE0022B60AP	Rack instruction sheet	1	

NOTE 1: This part can be used for 50 Hz and 60 Hz areas.
NOTE 2: If the customer has an NE-7720 and wants to change the frequency (60 Hz to 50 Hz), please order Ref. No.1 (Escutcheon base assembly: ANE800LG00PP), Ref. No.2 (High voltage transformer: ANE6005B60PP), Ref. No.3 (High voltage capacitor: ANE6090B60PP) and Ref. No.4 (Lead wire: ANE0361-C90).

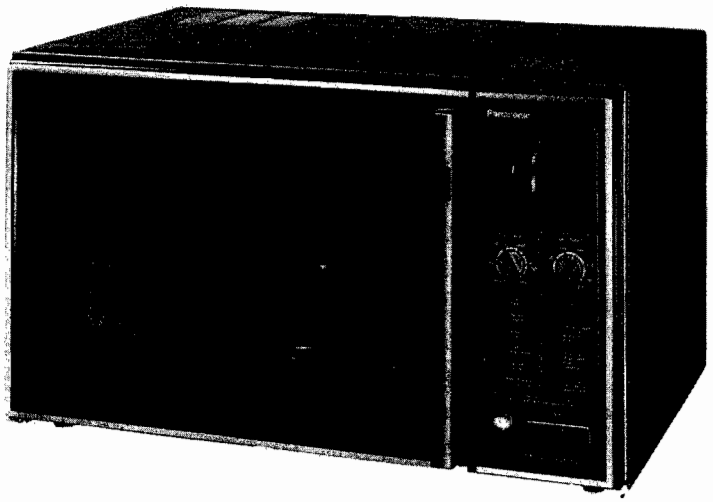
Printed in Japan

ORDER NBR. MOD-7904-004

Service Manual

Microwave Oven

NE-7720, NE-7720C



NE-7720 for U.S.A.

NE-7720C for Canada

SPECIFICATIONS

Power Source:	115 V AC Single Phase: 60Hz
Power Requirement:	1.42KW (13.0A)
High Frequency Output:	700W (High Power)
	650W to 70W (Variable power range)
Oscillation Frequency:	2450MHz,
Magnetron:	2M157-M2
Timer:	1 Hour (Two Speed)
Cooling Method:	Air Cooling
Approximate Outside Dimensions.	24-3/4"(W) x 18-1/2"(D) x 14-3/4"(H)
	63.0cm(W) x 47.0cm(D) x 37.5cm(H)
Approximate Oven Cavity	15-1/2"(W) x 15-1/2"(D) x 9-1/2"(H)
Dimensions:	39.5cm(W) x 39.5cm(D) x 24.0cm(H)
Approximate Weight:	71lbs
	32Kg

Specifications subject to change without notice.

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WARNING

1. This product should be serviced only by trained qualified personnel.
2. Though this product has been manufactured in compliance with:
   "Federal Performance Standard 21 CFR Subchapter J" (HEW): NE-7720
   or "Radiation Emitting Devices Act" (NHW): NE-7720C
   it is very important when servicing to avoid being exposed to excessive microwave radiation. This may be hazardous. All repairs shoud be made in accordance with procedures described in this manual.
3. Check for radiation leakage after every servicing according to the "procedure for measuring radiation leakage" on pages 23 & 24.
4. Any serviceman who learns of any accident pertaining to microwave radiation leakage should immediately notify the appropriate address listed below.

IN U.S.A.	PANASONIC COMPANY Division of Matsushita
(MECA)	Electric Corporation of America
	One Panasonic Way,Secaucus,New Jersey 07094
	Attention:Quality Assurance Dept.
	(201) 348-7000
IN HAWAII	PANASONIC HAWAII, INC.
(PHI)	320 Waiakamilo Road, Honolulu, 96817
	(808) 847-5361
IN CANADA	MATSUSHITA ELECTRIC OF CANADA LIMITED
(MELCA)	5770 Ambler Drive, Mississauga, Ontario, L4W 2T3
	(416) 624-5010

5. There are special components used in the microwave oven which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent microwave leakage, shock, fire, or other hazards. Do not modify the original design.

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INSTALLATION

1. Check the grounding.
2. Confirm the power source capacity.
3. Use the microwave oven in an ambient temperature of less than 104°F(40°C).
4. Avoid using the microwave oven where humidity is high.
5. Position the microwave oven away from radios,TV'S, etc.
6. Place the microwave oven on a stable base.
7. Avoid placing anything on the top cover of the microwave oven that may interfere with the exhaust vents.

OPERATION

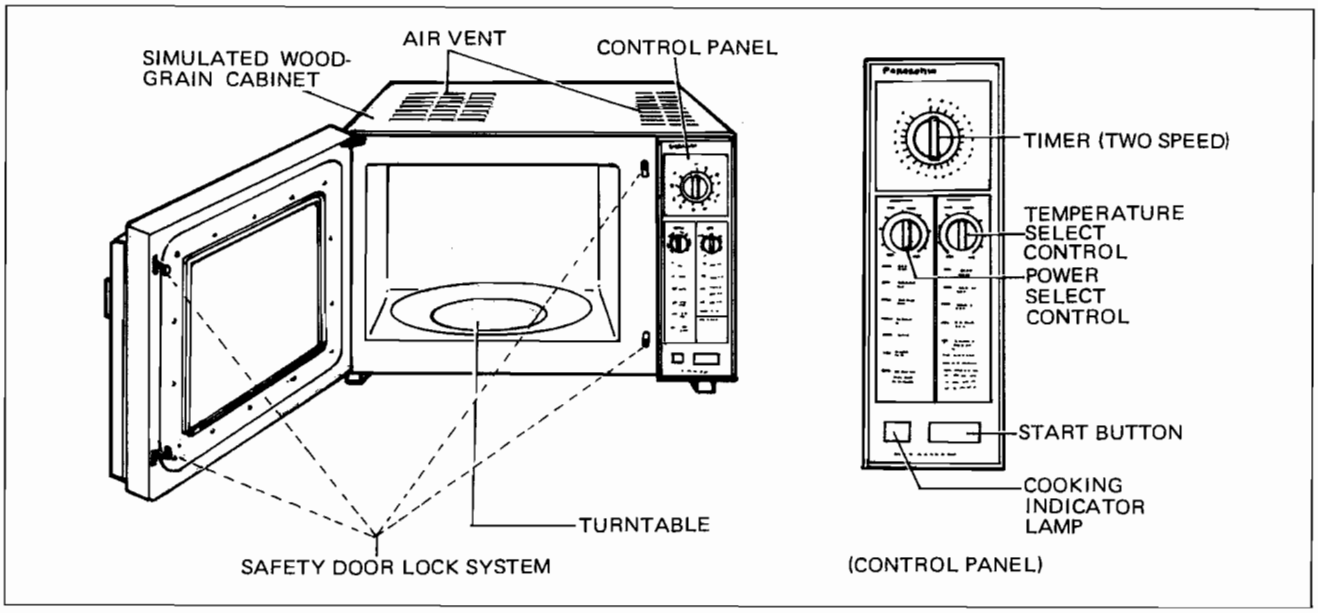


Fig. 1

TIME COOKING

1. Make sure Temperature Select Control is set at "OFF".If the control is not "OFF", simply turn the control to change to "OFF".
2. Choose cooking power by turning power select control to desired setting.
3. Set cooking time according to recipe.
4. Push start button.
5. When time has elapsed, beep sounds and oven turns off automatically. Oven lamp and cooking indicator lamp turn off. Fan motor and turntable stop and cooking stops.

TEMPERATURE COOKING

1. Set timer to "OFF".
2. Choose cooking power by turning power select control to desired setting.
3. Insert probe into food and place in oven. Connect probe jack to oven ceiling receptacle.
4. Choose temperature by turning temperature select control to desired temperature.
5. Push start button. Oven lamp and cooking indicator lamp turn on. Fan motor and turntable start rotating. cooking starts.
6. When temperature is reached, beep sounds and oven turns off automatically. Oven lamp and cooking indicator lamp turn off. Fan motor and turntable stop and cooking stops.
7. Remove probe jack from ceiling receptacle before removing food.
8. Store temperature probe in original container.

NOTE:

1. If cooking power and time are set and start button is pushed, oven will not work unless temperature select control is set at "OFF".
2. When setting timer for less than 2 minutes, turn timer past 2 minutes and then return to correct timing.
3. Make sure the temperature probe is removed from ceiling receptacle and oven before cooking by time.
4. If time is set and temperature probe is connected, oven will operate by time.
5. If time and temperature are set and temperature probe is connected, oven will operate by temperature.
6. If time and temperature are set and temperature probe is not connected, oven will not operate.
7. Beeper operation — Under the following conditions the oven will usually beep 5 to 8 times.
   A. When the door is opened during cooking.
   B. At the end of a cooking function.
   C. When the start button is pushed in and no cooking function has been set.
   A few seconds of operating may cause less than 5 beeps or none at all.

CAUTION WHEN USING

1. Do not use metalware
   In rare cases where you must use metal materials such as foil or skewers,etc., take care not to have the edge of the metal material touch the inner glass screen, or the oven walls (coated steel), because the glass plate may be broken the coated part may be burned by sparking.
2. Always keep the glass cooking tray clean.
   Do not cook foods with a high fat or sugar content directly on the glass tray.
3. Do not dry clothes in the microwave oven.
4. Avoid using wooden containers for more than a few seconds.
5. Do not operate the oven with a kitchen towel or a napkin left between the door and the front wall of the oven.
6. Do not press the cook button when the oven is empty.
7. Keep the inside of the oven clean.
8. Avoid cooking a small-volume of food for a long period of time.
9. If any visible steam or moisture is found on or around the door just wipe it off. There is no need for concern and this never causes any microwave leakage.
10. When removing the roller-ring from turntable for cleaning,be sure to re-install into the proper position. Avoid exposing your watch directly on the magnetic-capsules located on the bottom of the turntable, or your watch may be damaged.
11. When power select is set at a setting other than High, the intensity of the oven lamp will vary. This is normal and indicates that the oven is operating normally.

SCHEMATIC DIAGRAM

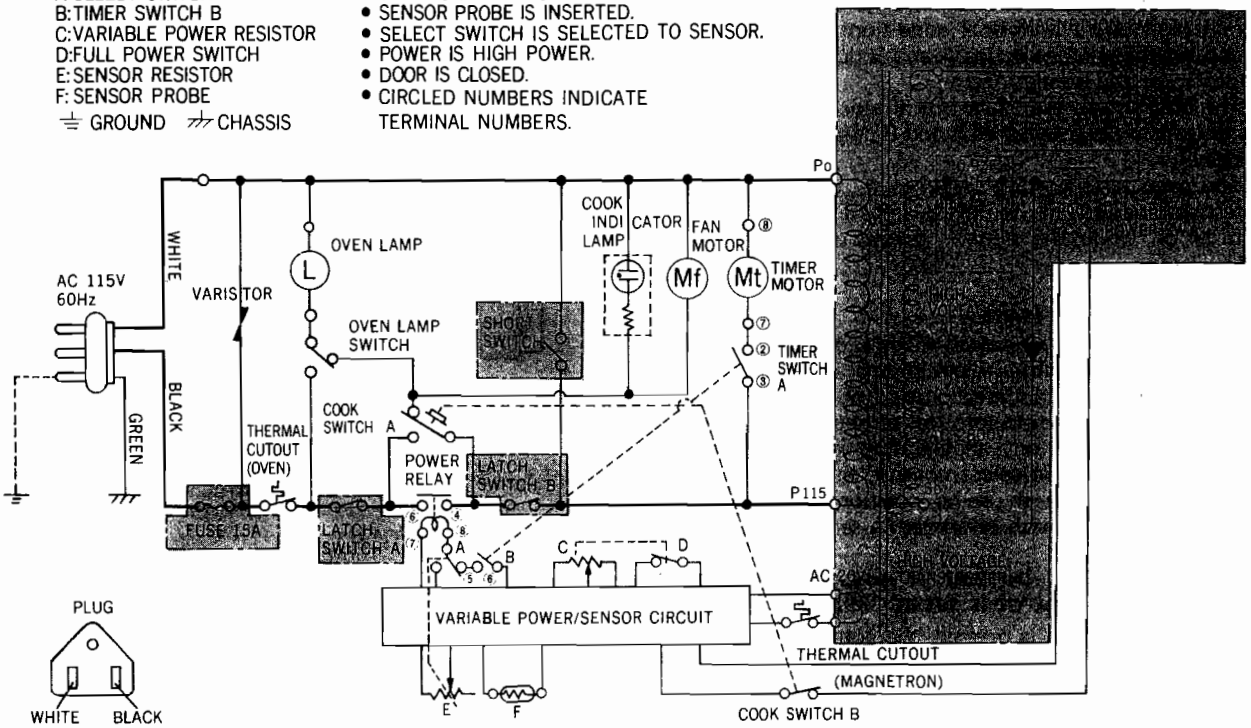
The figure below shows the schematic diagram for models NE-7720 and NE-7720C.

SCHEMATIC DIAGRAM NE-7720,NE-7720C

NOTE:1
A:SELECT SWITCH
B:TIMER SWITCH B
C:VARIABLE POWER RESISTOR
D:FULL POWER SWITCH
E:SENSOR RESISTOR
F:SENSOR PROBE
⏚ GROUND ⏚ CHASSIS

NOTE:2
- TIMER SWITCH IS OFF.
- SENSOR PROBE IS INSERTED.
- SELECT SWITCH IS SELECTED TO SENSOR.
- POWER IS HIGH POWER.
- DOOR IS CLOSED.
- CIRCLED NUMBERS INDICATE TERMINAL NUMBERS.

NOTE:3
THIS CIRCUIT DOES NOT CONTAIN 10Ω TEST RESISTOR.



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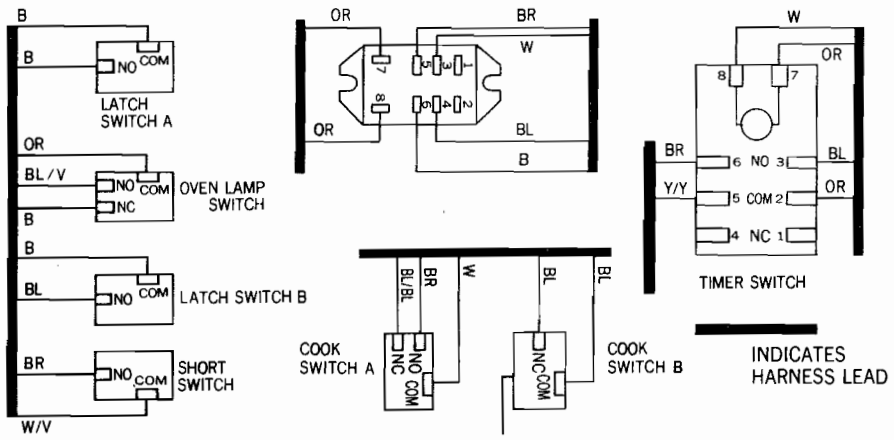
WIRING DIAGRAM



SYMBOL	COLOR
B	BLACK
BL	BLUE
BR	BROWN
OR	ORANGE
R	RED
W	WHITE
Y	YELLOW
V	VIOLET

Fig. 2

CIRCUIT DESCRIPTION

Refer to the schematic diagram on page 5.

1. When the food is placed inside the oven and door is closed.

(A) The contacts of the short switch open. This switch creates short circuit to blow 15 A fuse and stop magnetron oscillation when door is opened during operation under abnormal condition (i.e. both the contacts of latch switches A and B do not open the circuit to stop oscillation.)

(B) The door keyes are caught by the door hooks, the contacts of latch switches A and B close the primary circuit.

(C) The oven lamp switch switches to the right side terminal to turn off the oven lamp. The oven lamp turns on while the door is opened or magnetron oscillates.

2. When cook timer is set.

(A) The contacts of timer switch A and B close.

(B) Make sure temperature select control is set at OFF, Under this condition the contacts of select switch turn to Timer position in order to operate the oven with timer. When any temperature is choosen by turning temperature select control, the contacts of select switch turn to Temp position in order to operate the oven with temperature sensor cooking.

3. When the cook button is pressed. (While power select control is set at "High" power.)

(A) While cook button is pressed, the contacts of cook switch A close between NO and COM terminals. And also the contacts of cook switch B open.

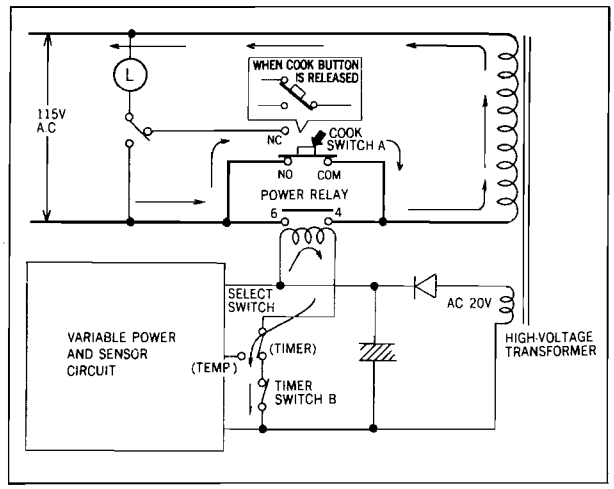


Fig. 3

(B) 115 volts A.C is applied to the high voltage transformer through cook switch A as shown by the solid line ——→ in fig.3.

(C) 20 V A.C appears on the A.C 20 V winding of high voltage transformer and is converted to D.C for power relay coil. Thereby, energizing the power relay and then relay contacts are closed.

(D) After cook button is released, oven lamp and cook indicator lamp turn on.

(E) Fan motor and turntable start rotating. The fan cools the magnetron by blowing the air coming from the intake on the back panel over the magnetron fins. Also the fan motor drives the turntable by means of gears, belts and pulleys for uniform cooking.

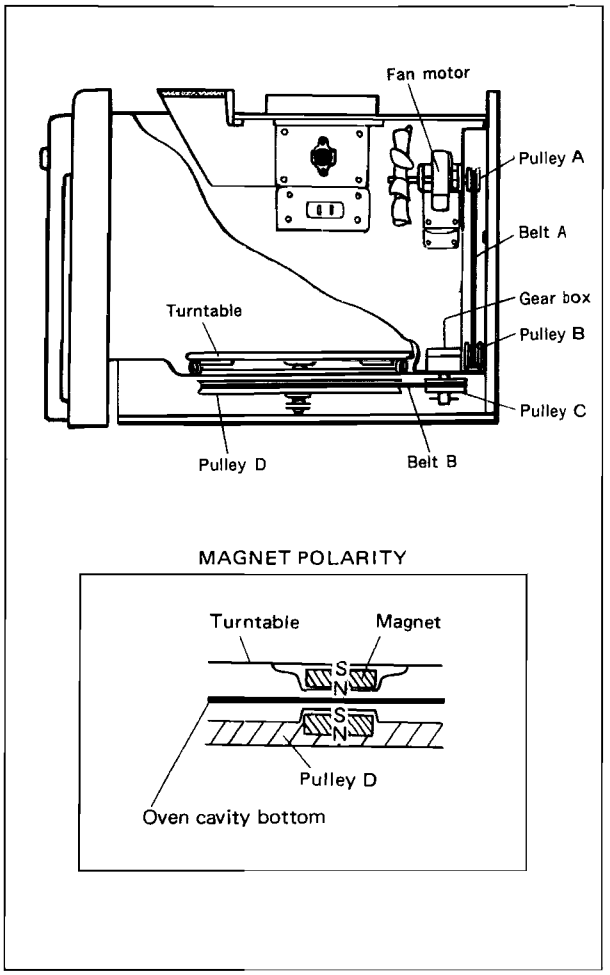


Fig. 4

(F) Cook timer motor rotates.

(G) 3.2 volts AC is generated from the filament winding of the high voltage transformer. This 3.2 volts is applied to the magnetron to heat the magnetron filament through two noise preventing choke coils.

(H) A high voltage of 2,800 volts AC is generated in the secondary of the high voltage transformer and this secondary voltage is increased by the action of the diode and the charging of the high voltage capacitor. This resultant DC voltage is then applied to the anode of the magnetron. As shown in fig.5, the first half cycle of the high voltage produced in the high voltage transformer secondary charges the high voltage capacitor. Current flow is in the direction of the dotted-line - - - - - - - - →. During the second half cycle, the voltage produced by the transformer secondary, and the charge of the high voltage capacitor are combined and applied to the magnetron as shown by the solid-line ——→ so that oscillation begins. The disturbance wave generated by the magnetron is prevented by the choke coils of 1.6μH, filter capacitors of 500pF and the magnetron's shielded case so that TV and radio programs are not impaired by noise.

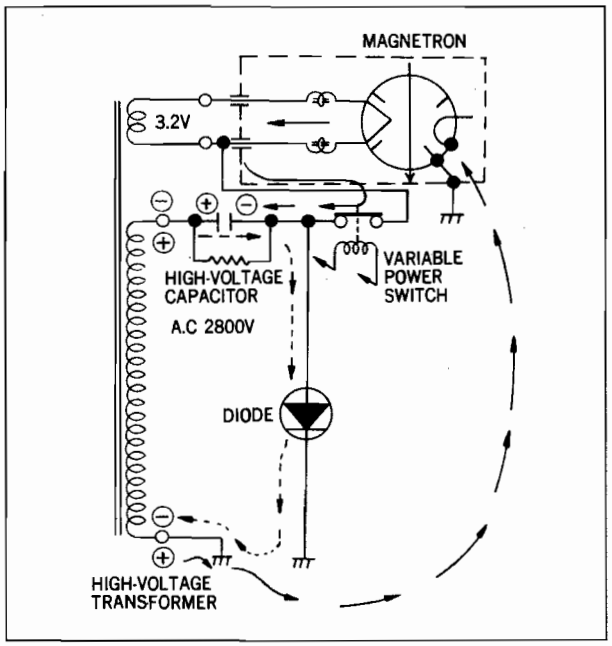


Fig. 5

(I) The coil of variable power switch is energized intermittently by the variable power circuit, when the oven is set at any power selection except High power position. The variable power circuit controls the ON-OFF time of the variable power switch contacts in order to vary the output power of the microwave oven from "Warm" to "High" power. One complete ON and OFF cycle of the variable power switch is 22 seconds. The relation between indications on the control panel and the output power of the microwave oven is as follows:

INDICATION	OUTPUT POWER AGAINST HIGH POWER	ON, OFF TIME ON VARIABLE POWER SWITCH
High	22/22 (100%)	22(S) ON, 22(S) ON
M.High	20/22 (91%)	20(S) ON, OFF, ON, OFF
Med	15/22 (68%)	15(S) ON, OFF, ON, OFF
M.Low	11/22 (50%)	11(S) ON, OFF, ON, OFF
Low	6/22 (27%)	6(S) ON, OFF, ON, OFF
Warm	2/22 (10%)	2(S) ON, OFF, ON, OFF
Defrost	7/22 (32%)	7(S) ON, OFF, ON, OFF

Fig. 6

4. When the door is opened during cooking.

(A) Latch switch A (primary) and latch switch B (secondary) open to cut off the primary voltage to stop microwave oscillation.
(B) Buzzer beeps.
(C) Cook indicator lamp is turned off.
(D) Timer, fan motor and turntable stop functioning.
(E) Power relay is de-energized.
(F) As soon as the door handle button is pressed, the short switch contacts close and create the short circuit. If the contacts of latch switch A and B both malfunction, the 15 A fuse blows open due to the large current surge caused by the short switch activation, and this in turn stops magnetron oscillation.

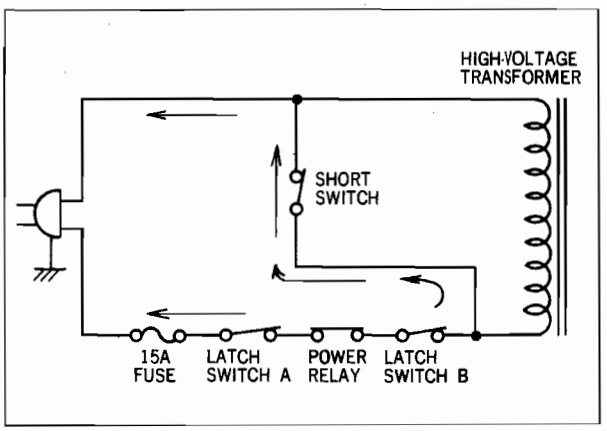
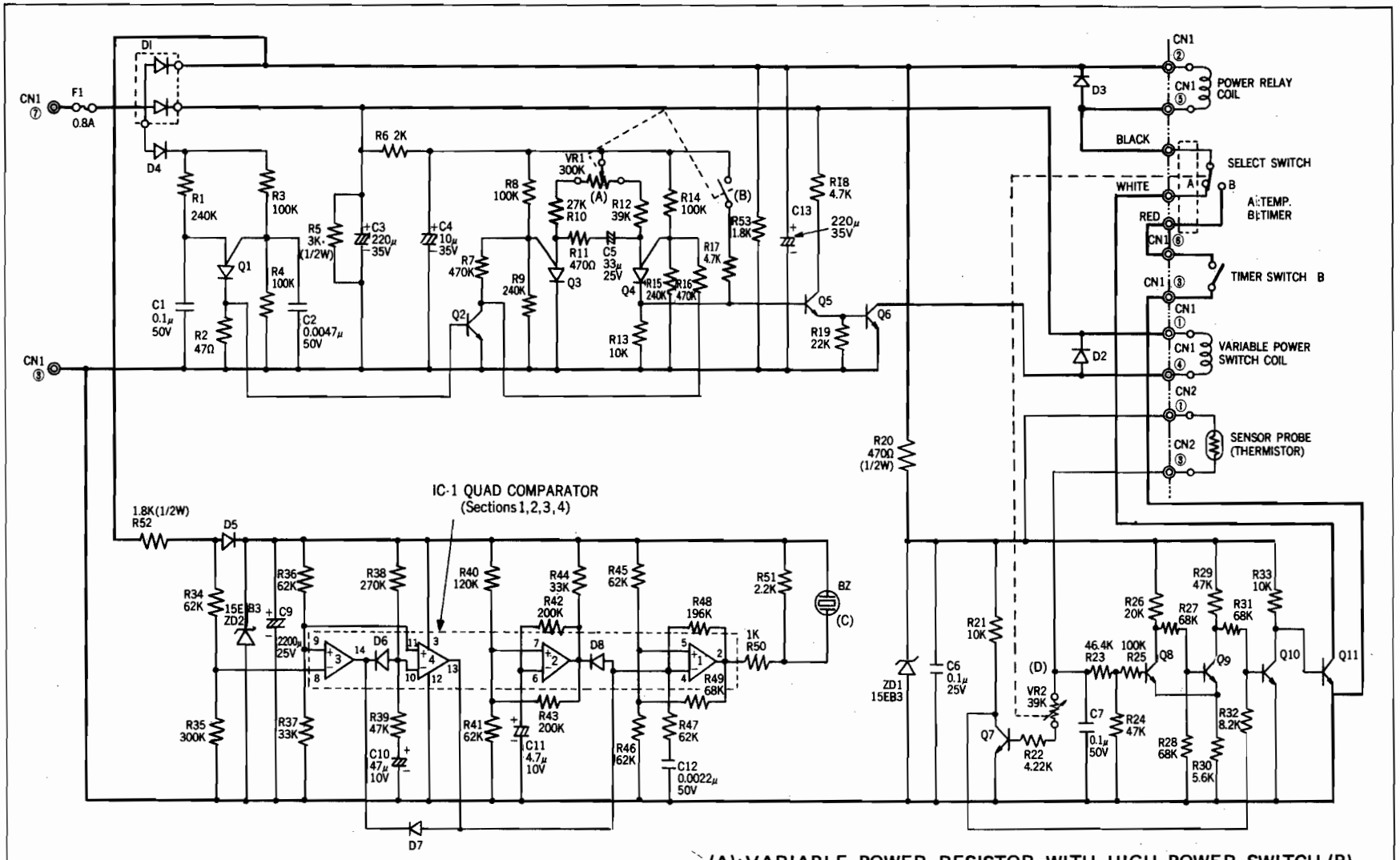


Fig. 7

NOTE:
Any time the door is opened, while power is supplied to the unit, the oven lamp will light.

5. Schematic diagram of printed circuit board

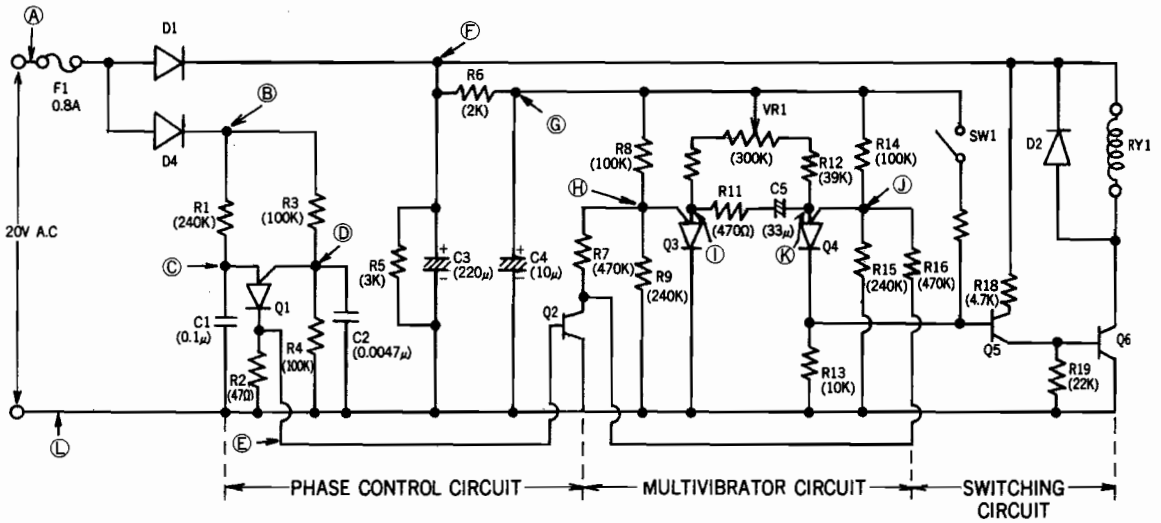


(A): VARIABLE POWER RESISTOR WITH HIGH POWER SWITCH (B)
(B): BUZZER
(D): SENSOR VARIABLE RESISTOR

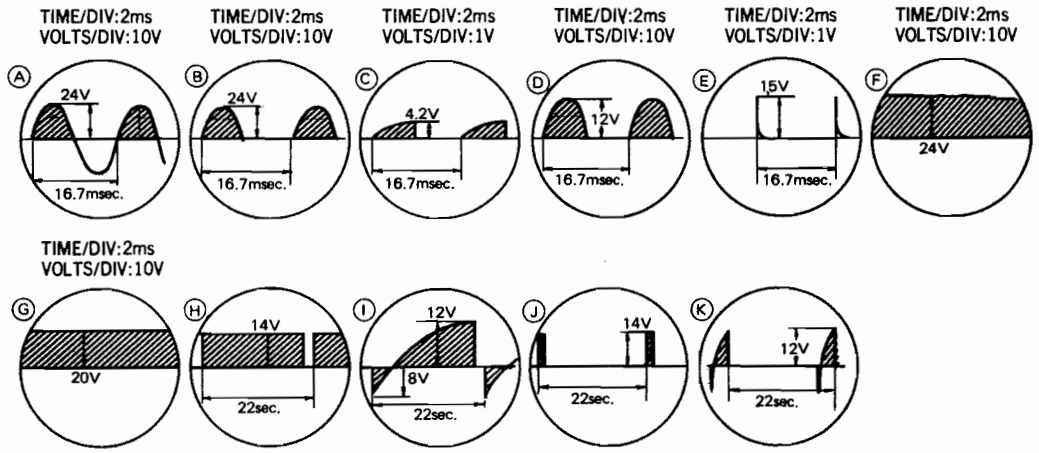
NOTE1: High power switch is incorporated in the variable power resistor and select switch is incorporated in the sensor variable resistor.
NOTE2: The circled numbers indicate the terminal numbers on the printed circuit board.
NOTE3: Timer switch is set at off, any temperature is chosen and sensor probe is plugged in.

Fig. 8

6. Variable power circuit



VR1: VARIABLE POWER RESISTOR
SW1: HIGH POWER SWITCH
RY1: VARIABLE POWER SWITCH COIL



NOTE1: The ground line of oscilloscope should be connected to the Ⓛ line to observe the wave form.
NOTE2: To check wave forms Ⓗ, Ⓘ, Ⓙ, and Ⓚ, you need both an oscilloscope and a watch, but you can not observe these wave forms directly by oscilloscope.
NOTE3: To check wave form, you set TIME/DIV and VOLTS/DIV knob of oscilloscope as shown above wave forms.

Fig. 9

The variable power circuit consists of the phase control circuit, the multivibrator circuit and switching circuit as shown in fig 9.
The variable power circuit has the function to control the open-close time of the variable power switch contacts in order to vary the output power of the microwave oven from 70W to 700W on the average.
The relation between indications on the front escutcheon and the output power of the microwave oven is as follows:

INDICATION	OUTPUT POWER AGAINST HIGH POWER	ON, OFF TIME ON VARIABLE POWER SWITCH
High	22/22 (100%)	22(S) ON 22(S) ON
M.High	20/22 (91%)	20(S) ON OFF ON OFF
Med	15/22 (68%)	15(S) ON OFF ON OFF
M.Low	11/22 (50%)	11(S) ON OFF ON OFF
Low	6/22 (27%)	6(S) ON OFF ON OFF
Warm	2/22 (10%)	2(S) ON OFF ON OFF
Defrost	7/22 (32%)	7(S) ON OFF ON OFF

Fig. 10

(1) Phase control circuit

This circuit has the function to control the open-close timing of the variable power switch to avoid its opening and closing while high voltage is applied on the variable power switch. If this circuit is out of order, interference with TV and radio might occur due to arc generated across the variable power switch. In addition the switch itself could be damaged.

(A) After pressing the cook switch button, 20 volts AC is generated from the high voltage transformer and is applied to the variable power circuit.

(B) When a forward voltage (24 volts DC) is applied to the diode D4, the voltage is applied to the capacitor C1 for charging and R3 and R4 for the gate voltage of the programable unijunction transistor Q1.
The 24 volts of half wave voltage is divided by the R3 (100KΩ)–R4 (100KΩ) combination and 12 volts of half wave voltage is applied on gate Q1.

(C) When the charging voltage of C1 reaches more than gate voltage of Q1, it causes Q1 to conduct, so a voltage is developed across R2 (47Ω).

(D) The voltage across R2 forward-biases the base-emitter junction of transistor Q2 allowing it to conduct.

(E) The 24 volts DC generated by the smoothing effect of diodes D1 and the chemical capacitors C3 is applied onto the multivibrator circuit. The gate voltages of the transistors Q3 and Q4 are determined by the R6 (2KΩ)–R8 (100KΩ)–R9 (240KΩ) combination or the R6 (2KΩ)–R14(100 KΩ)–R15 (240KΩ) combination and switching action of Q2. When the high voltage is not applied on the variable power switch, Q2 conducts and the gate voltages of Q3 and Q4 drop down from 14 volts to 12 volts as shown by Ⓗ in fig.11.

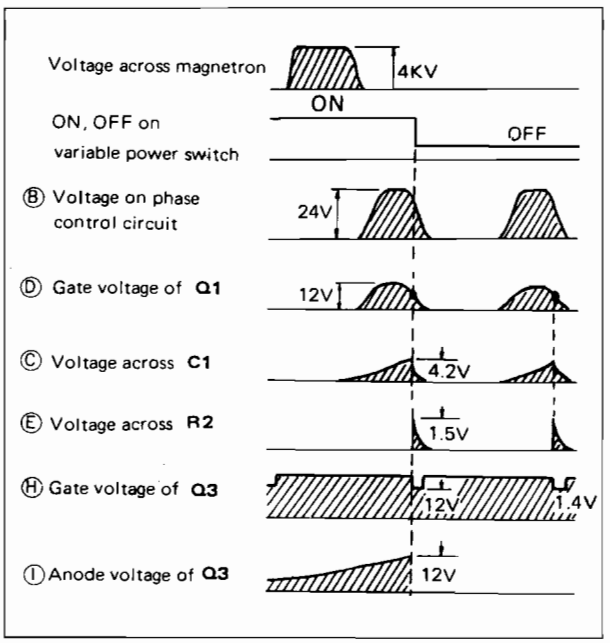


Fig. 11

(2) Multivibrator circuit and switching circuit

This circuit has the function to control the open-close time of the variable power switch contacts by manually varying the variable power resistor on the front escutcheon.
24V DC is generated by D1 and is smoothed by capacitors C3 and C4 and is then applied to the multivibrator circuit.
The gate voltages of Q3 and Q4 are determined by the R6–R8–R9 combination and the R6–R14–R15 combination , plus the switching effect of Q2 on both combinations.
When the circuit is first energized the transistor with the highest anode potential will conduct first.

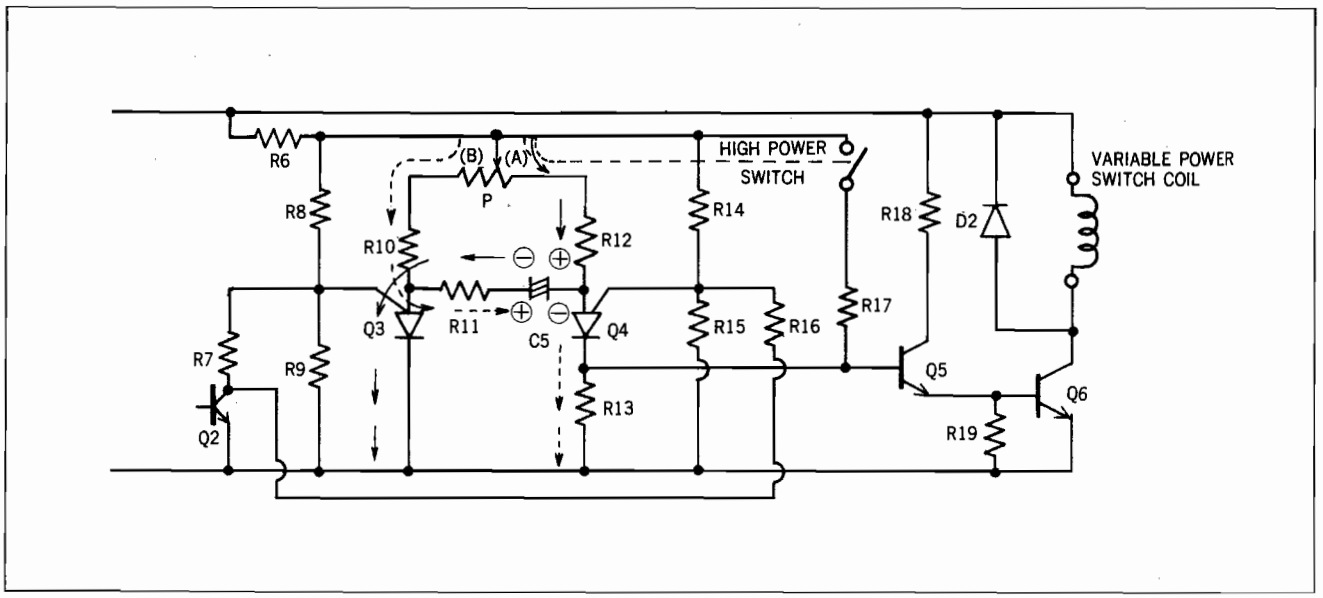


Fig. 12

(A) Assuming that the anode voltage of Q3 is more than the anode voltage of Q4 when the circuit is first energized, Q3 conducts and 12 volts DC on the gate of Q3 becomes approx. 0 volt.
This causes current to flow as shown by the solid-line ——→ in fig 12 and causes charging of capacitor C5.

(B) The charging time of C5 is determined by the time constant of the series combination of the variable power resistor (portion A) plus R12–C5–R11. When the anode voltage of Q4 exceeds the gate voltage (12 volts) by the charging of C5, it causes Q4 to conduct (shown by the dotted-line - - - →)and Q3 cuts off.

(C) The voltage across R13 forward-biases the base emitter junction of Q5 allowing it to conduct. This in turn allows Q6 to conduct. After Q6 conducts, 24 volts DC is applied to the variable power switch coil, thereby energizing the variable power switch to apply high voltage to the magnetron for oscillation.

(D) When Q4 conducts, the current flow is indicated by the dotted-line - - - →as shown in fig 12, thereby charging. When the anode voltage of Q3 exceeds the gate voltage (12 volts) due to the time constant determined by the variable power resistor portion (B)–R10–R11–C5–R13, it causes Q3 to conduct and Q4 to cut off stopping magnetron oscillation.
The anode voltage of both Q3 and Q4 exceeds 12 volts causing Q3 and Q4 to conduct alternately. In this way, the signal is applied intermittently to Q5 and Q6 so that the magnetron oscillates microwaves intermittently.

(E) The more the "P" point on the variable power resistor is moved to the right (by turning clockwise the power select control knob on the front escutcheon), the longer Q4 conducts producing a higher output power for the microwave oven. When the "P" point is set to the extreme right end of the variable power resistor, the high power switch closes. This will keep Q5 and Q6 conducting constantly thereby causing the variable power switch to remain energized which causes constant "High" power oscillation.

NOTE: It is possible to check the time duration of one complete cycle of the variable power circuit. One complete ON and OFF cycle of the magnetron should be 22±7 seconds. While timing, except for the "High" power position, it does not matter which power output setting is indicated by the power select control on the front panel. What is important is the time duration taken by one complete ON and OFF cycle of the magnetron. Observing the oven light going dim and then going bright again is a simple way to check the ON and OFF times of the magnetron.

7. Temperature sensor circuit

When using the sensor probe for automatic temperature control, the temperature sensor circuit works as follows.

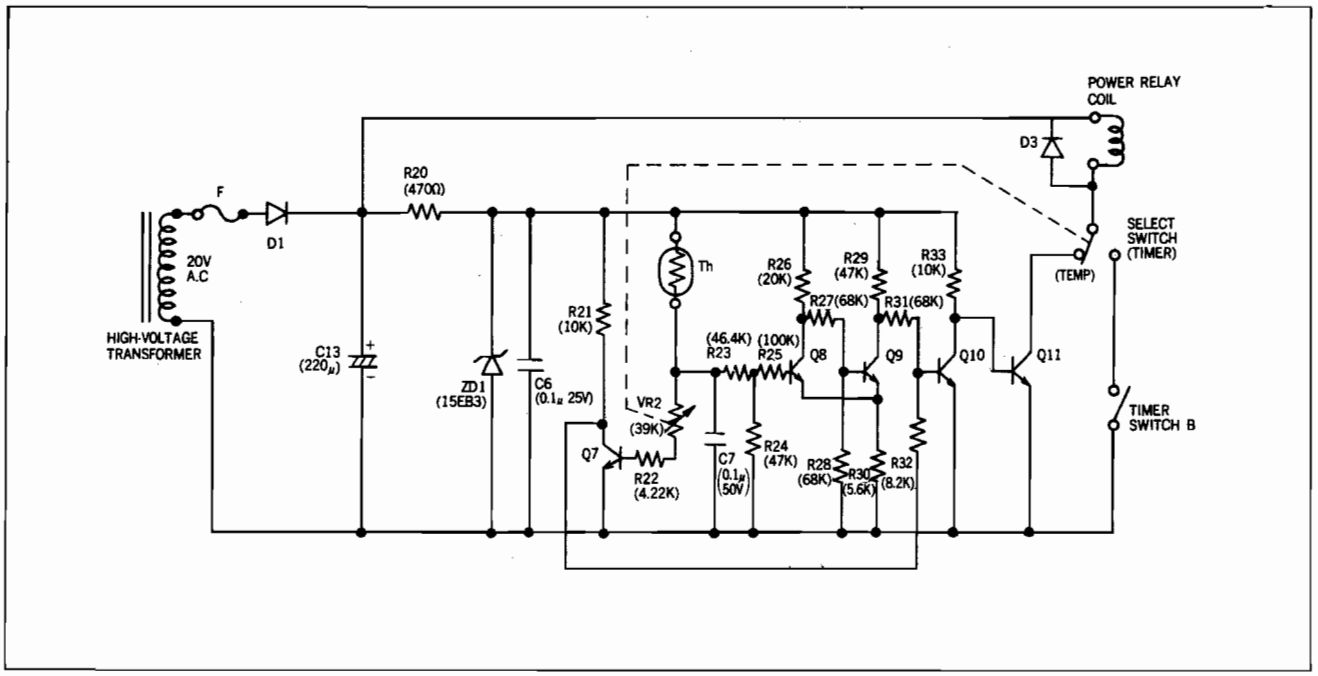


Fig. 13

(A) Choose temperature by turning temperature select control to desired temperature (115°F–200°F).
(B) Connect probe jack to the oven ceiling receptacle. The thermistor (Th) in sensor probe is connected in series with the sensor variable resistor.
(C) 20 volts generated from the high voltage transformer is converted to 24 volts D.C by the diode D1. The capacitor C3 smoothes the D.C voltage.
(D) 24 volts D.C is decreased by R20 creating 15 volts D.C for the sensor circuit. The zener diode stabilizes 15 volts D.C.

This voltage forward-biases the base-emitter junction of Q7 and Q9 causing them to conduct. Conducting Q9 keeps Q10 open so that 15 volts D.C forward-biases the base-emitter junction of Q11 allowing it to conduct. The 24 volts D.C is applied to the power relay coil as shown in fig.14 and the relay contacts are closed.

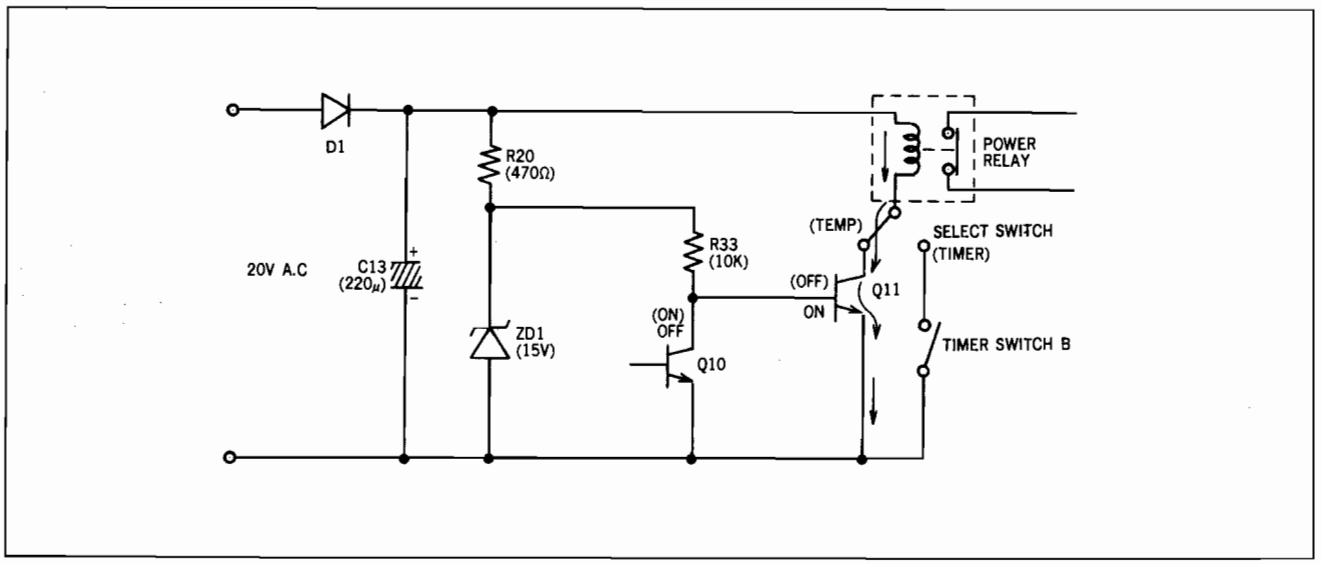


Fig. 14

(E) When the food temperature goes up,the resistance of the thermistor goes down. Therefore, the voltage between base and emitter of Q8 goes up. When the base voltage of Q8 exceeds emitter voltage, Q8 will conduct. This happens when the temperature of food reaches the desired temperature.

(F) When Q8 conducts, Q9 cuts off and about one volt forward-biases the base-emitter junction of Q10 causing it to conduct.

(G) When Q10 conducts, Q11 will cut off causing the power relay contacts to open.

NOTE: If a sensor probe component such as the thermistor, or the sensor probe lead wire should open, no bias is supplied to Q7 causing it to cut off. So 15 volts forward-biases the base emitter junction of Q10 through R21 and R32, allowing Q10 to conduct and Q11 to cut off. This action will open the power relay contacts.

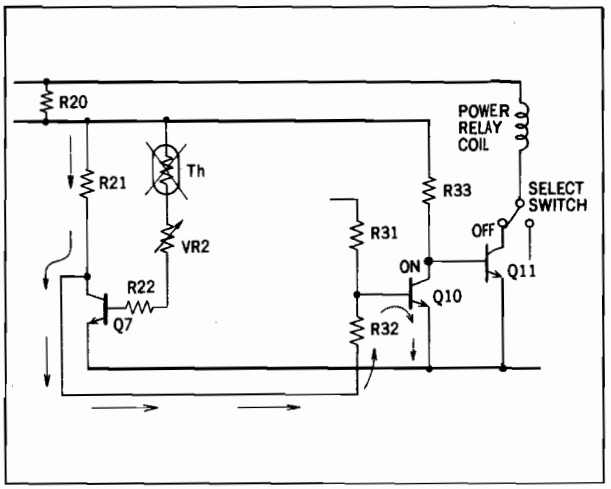


Fig. 15

To test the sensor probe's thermistor

Fill a container partially with lukewarm water and place a thermometer in it. Then take the sensor probe out of the oven and place it in the container next to the thermometer so they both will sense the same exact temperature. Now take another container with boiling hot water and gradually pour this into the first container to achieve graduated temperature steps. At each temperature step listed in the above chart, you shoud read the corresponding resistance with an ohmmeter. If not, the probe is defective and must be replaced.

Temp.		Thermistor Resistance Norminal (kΩ)	Temp.		Thermistor Resistance Norminal (kΩ)
(°C)	(°F)		(°C)	(°F)	
30	86	44.4	60	140	13.7
35	95	35.9	65	149	11.5
40	104	29.3	70	158	9.7
45	113	24.0	75	167	8.2
50	122	19.8	80	176	7.0
55	131	16.4	85	185	6.0
			90	194	5.1

Fig. 16

8. Beep sound circuit

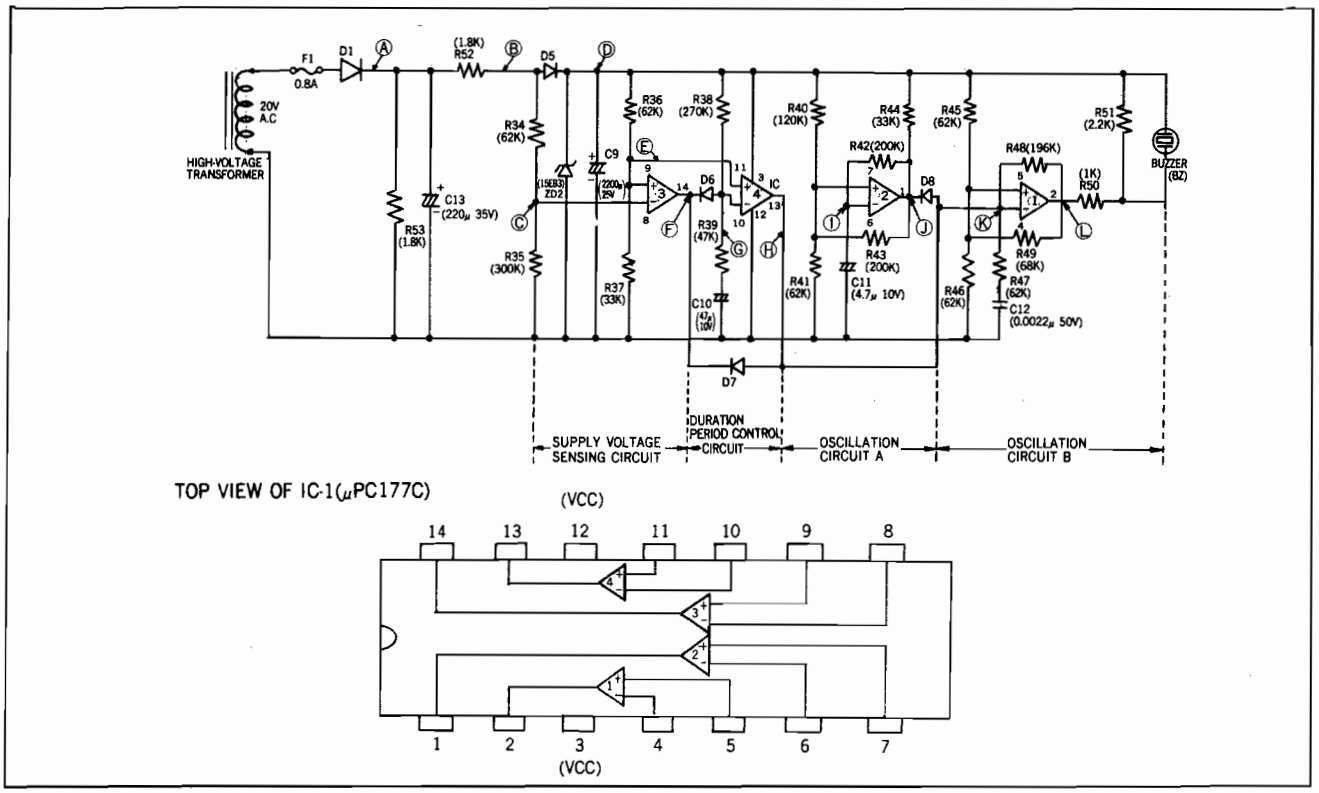


Fig. 17

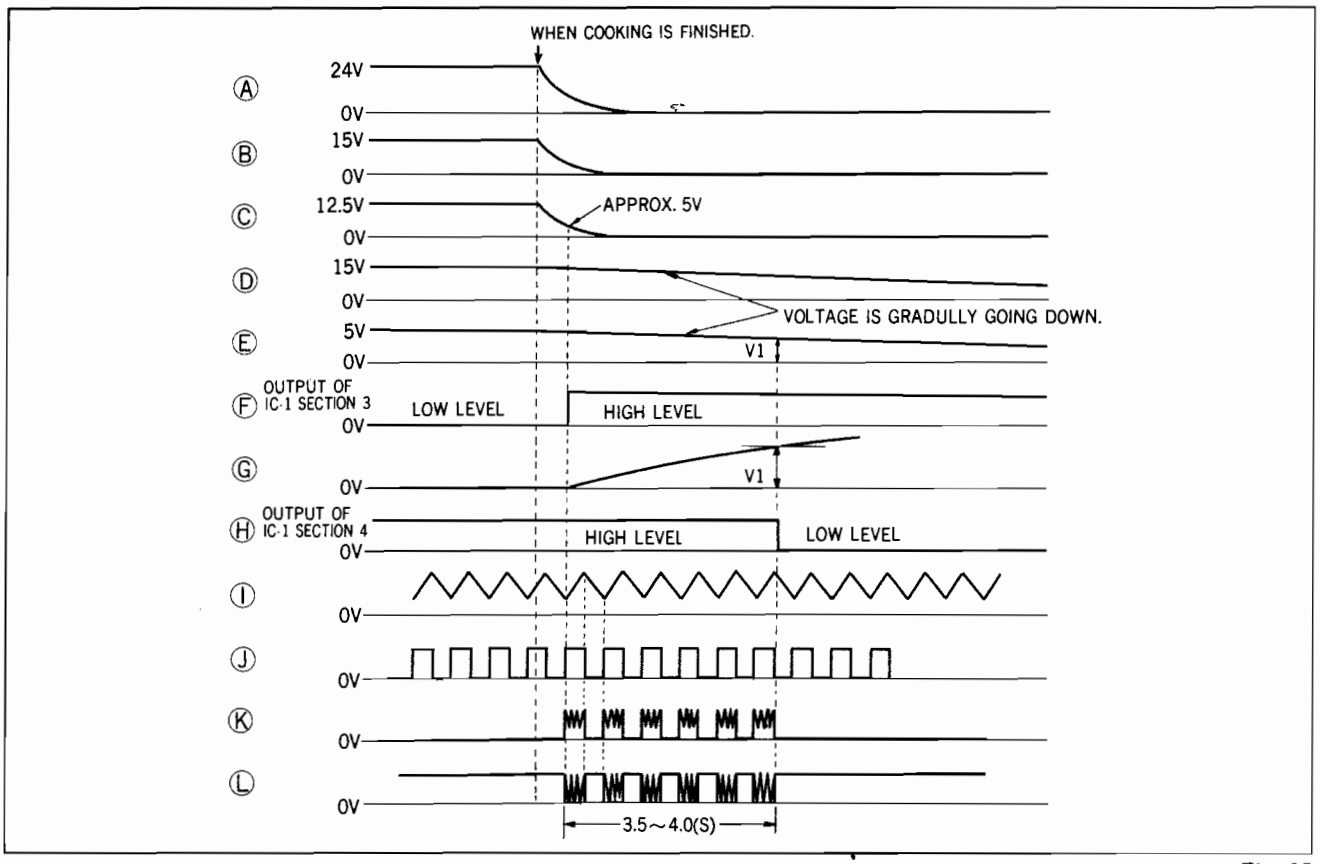


Fig. 18

NOTE 1: The high level of sections 3 and 4 of IC-1 is a floating level, which means the output terminal is isolated from any other voltage level under a high level output. Under a floating condition, the actual wave form of the floating terminals will be changed dependent upon the other signals connected. Therefore, the output waves of sections 3 and 4 of IC-1 will look like wave form K.

NOTE 2: With the exceptions of K and L, none of the wave forms above can be observed directly by an oscilloscope. In addition only the circled portion of waves K and L can be seen intermittently by an oscilloscope.

The beep sound circuit consists of a supply voltage sensing circuit, a duration period control circuit, and two oscillation circuits named Oscillation circuit A and Oscillation circuit B. IC-1 (μPC177C), known as a quad comparator, works as a comparator for each circuit in the beep sound circuit.

(1) Supply voltage sensing circuit (IC-1, Section 3)
This circuit has the function to start the beeping sound when cooking is finished by detecting the voltage drop in the power source.

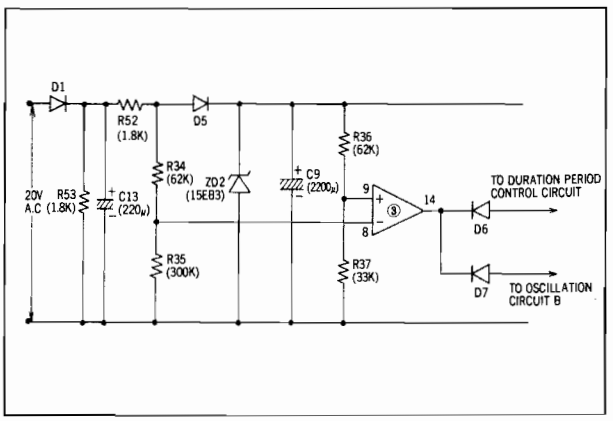


Fig. 19

(A) While 20 V A.C is generated from the high voltage transformer, the line voltage of the beep sound circuit is kept at a constant 15 volts by zener ZD 2. Under this condition, terminal 8 (inverting input) of section-3 has a higher voltage than terminal 9(non-inverting input) so that the output voltage of section-3 is kept at 0 volts (low level). No voltage is applied to oscillation circuit B causing it to stop oscillating.

(B) When cooking is finished, the contacts of the power relay open and no voltage is generated from the 20V winding.

(C) Please refer to the waveforms shown in fig.18. The line voltage of the beep sound circuit decreases slowly by discharging C9 (2200μF) so that the voltage of terminal 9 also drops slowly.

(D) At the same time, the voltage of terminal 8 decreases rapidly due to smaller line capacitance than the capacitor C9.

(E) When terminal 9 voltage exceeds terminal 8, the output voltage terminal 14 changes to high level.

(F) When high level comes out from terminal 14, the duration period control circuit and oscillation circuit B start functioning.

(2) Duration period control circuit (IC-1, Section 4)
This circuit has the function to provide the time duration of how long the buzzer makes the beeping sounds.

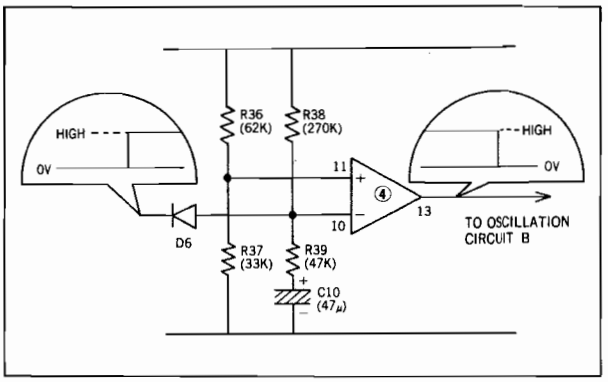


Fig. 20

(A) When the output of terminal 14 changes to high level from 0 volts. C10 starts charging causing the terminal 10 voltage (inverting input) to increase.

(B) While terminal 10 has lower voltage than terminal 11 (non-inverting input), the output is kept at high level. When terminal 13 is at high level, oscillation circuit B keeps oscillating to make the beep-sound.

(C) When the voltage of terminal 10 exceeds that of terminal 11 because of the charging of capacitor C10, the output of terminal 13 changes to 0 volts (low level) from high level.

(D) When this output becomes 0 volts, terminal 4 of IC-1 (section 1) in oscillation circuit B goes to 0 volts. This causes oscillation circuit B to stop oscillating.

(3) Oscillation circuit A (IC-1, Section 2)

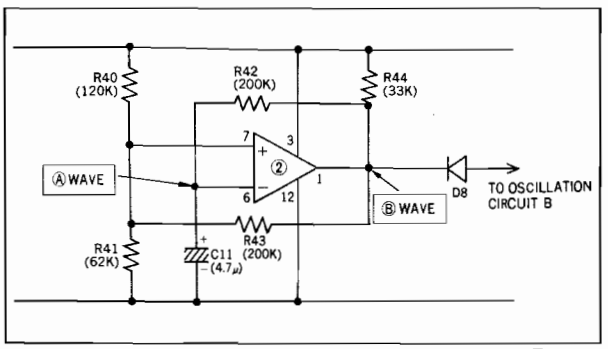


Fig. 21

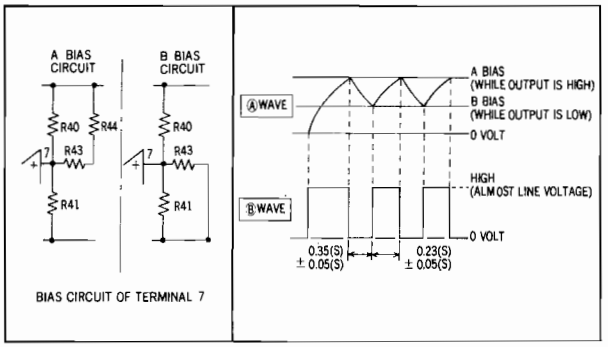


Fig. 22 **Fig. 23**

(A) This circuit is oscillating as long as the power plug is plugged in.
The oscillation wave is the pulse wave shown in fig. 23.
This means the output of oscillation circuit A is either high level or low level.

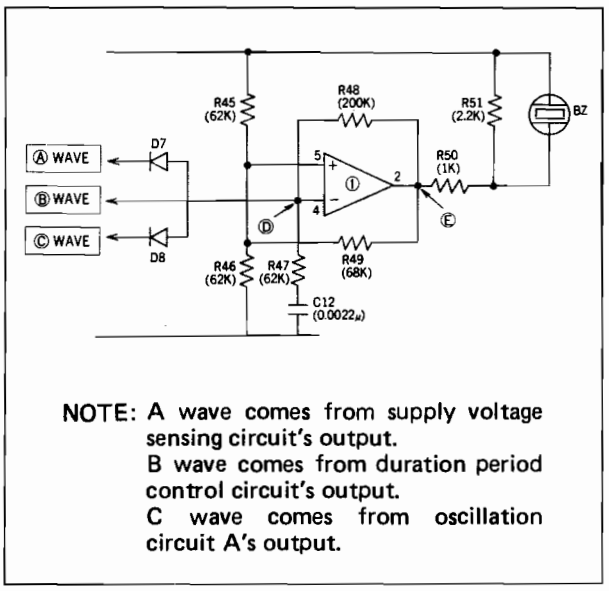
(B) Please refer to figure 22. While the output of terminal 1 is high level, the bias voltage of terminal 7 (non-inverting input) is determined by circuit A shown in fig. 22. And while the output is low level, the bias voltage decreases by changing the resistors combination, as shown by circuit B in fig.22.

(C) The moment 15 volts D.C is supplied to the circuit, C11 starts charging as shown in fig.23 causing the voltage of the terminal 6 (inverting input) to increase. At this time, terminal 7 is fixed at A bias voltage.
When the voltage of terminal 6 exceeds that of terminal 7 by the charging of C11, the output terminal 1 changes to low level (0 volts).

(D) While the output is 0 volts, the voltage of terminal 6 goes down by the discharging of C11.
When the voltage of terminal 6 goes down lower than terminal 7, the output changes back to high level.

(E) In this way, the output changes back and forth between the high and low levels causing the circuit to work as a low frequency oscillator.

(4) Oscillation circuit B (IC-1 Section 1)



NOTE: A wave comes from supply voltage sensing circuit's output.
B wave comes from duration period control circuit's output.
C wave comes from oscillation circuit A's output.

Fig. 24

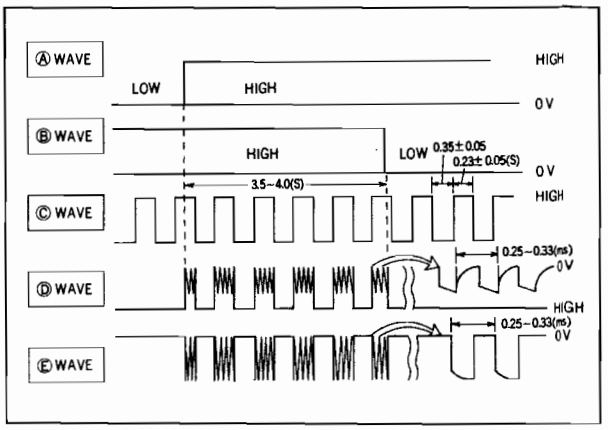


Fig. 25

(A) Oscillation circuit B works just like oscillation circuit A, but different in frequency. The oscillation frequency is 3 KHz to 5KHz.

(B) While this circuit oscillates, the buzzer makes the beeping sounds.

(C) While the signals of A, B and C are all high level, oscillation circuit B works as an oscillator by charging or discharging C12.

(D) The E signal shown in fig. 25 is applied to the buzzer. And the buzzer makes the beeping sounds 5 to 8 times.

PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(A) Do not operate or allow the oven to be operate with the door open.
(B) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
  (1) Interlock operation
  (2) Proper door closing
  (3) Seal and sealing surfaces (arcing, wear, and other damage)
  (4) Damage to or loosening of hinges and latches
  (5) Evidence of dropping or abuse
(C) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide or transmission line, and cavity for proper alignment, integrity and connections.
(D) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
(E) A microwave leakage check to verify compliance with the Goverment performance standard should be performed on each oven prior to release to the owner.

CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING

Unlike many other appliances, the microwave oven is high-voltage, high-current equipment. Though it is free from danger in ordinary use, extreme care shoud be taken during repair.

CAUTION

SERVICEMEN SHOULD REMOVE THEIR WATCHES WHENEVER WORKING CLOSE TO OR REPLACING THE MAGNETRON.

1. Check the grounding

Do not operate on a 2-wire extension cord. The microwave oven is designed to be used when grounded. It is imperative, therefore, to make sure it is grounded properly before beginning repair work.

2. Warning about the electric charge in the high voltage capacitor

For about 30 seconds after the oven stops, an electric charge remains in the high voltage capacitor. When replacing or checking parts, short between oven chassis and the lower terminal of variable power switch by an insulated screw driver to discharge.
See figure 26.

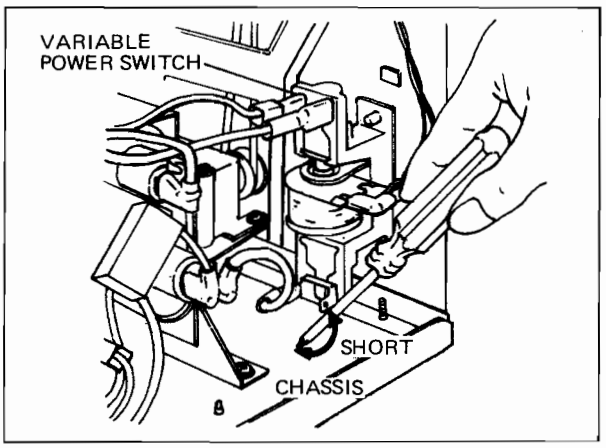


Fig. 26

WARNING

THERE IS HIGH-VOLTAGE PRESENT, WITH HIGH-CURRENT CAPABILITIES IN THE CIRCUITS OF THE HIGH VOLTAGE TRANSFORMER SECONDARY AND FILAMENT TRANSFORMER SECONDARY. IT IS EXTREMELY DANGEROUS TO WORK ON OR NEAR THESE CIRCUITS WITH THE OVEN ENERGIZED.

WARNING

NEVER TOUCH ANY CIRCUIT WIRING WITH YOUR HAND OR INSULATED TOOL DURING OPERATION.

3. When parts must be replaced, remove the power plug from the outlet.

4. When the 15 Amp fuse is blown due to the operation of short switch:

(A) Replace the latch switch A (primary), latch switch B (secondary) and short switch. This is mandatory. Refer to pages 21 & 22 for the necessary adjustments for these switches.

(B) When replacing the fuse, confirm that it has the appropriate rating for this model.

5. Avoid inserting nails, wire, etc. through any holes in the unit during operation.

Never insert a wire, nail or any other metal object through the lamp holes on the cavity or any other holes or gaps, because such objects may work as an antenna and cause microwave leakage.

6. Confirm after repair

(A) After repair or replacement of parts, make sure that the screws of the oven, etc. are neither loose nor missing. Microwaves might leak if screws are not properly tightened.

(B) Make sure that all electrical connections are tight before inserting the plug into the wall outlet.

(C) Check for radiation leakage, (Refer to procedure for measuring radiation leakage on pages 23 & 24)

DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

1. Removal of outer panel

Remove the four screws from the front section and seven screws from the rear section. The outer panel nust be moved backward to be lifted off.

2. Replacement of the magnetron

CAUTION

SERVICEMEN SHOULD REMOVE THEIR WATCHES WHENEVER WORKING CLOSE TO OR REPAIRING THE MAGNETRON.

(A) Discharge the high voltage capacitor (see page 17)

(B) Remove the air guide A by removing 2 screws holding it to the oven cavity.

(C) Remove two high voltage leads from filament terminals.

(D) Remove two screws holding thermal cutout to magnetron.

(E) Remove four nuts holding the magnetron.

NOTE 1: Make sure that the embossed ring is rigidly attached on the magnetron anode. (see fig. 28)

NOTE 2: To prevent microwave leakage, tighten the mounting nuts properly making sure there is no gap between the waveguide and the magnetron.

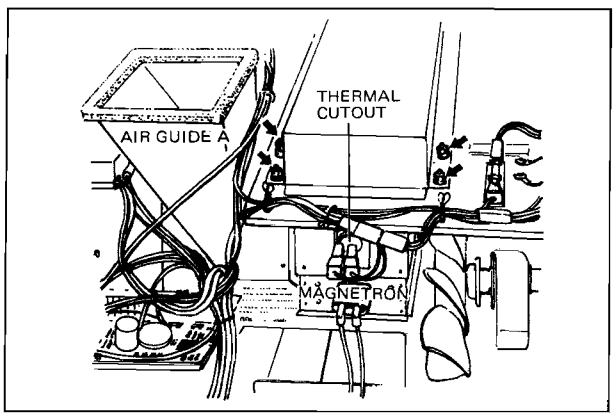


Fig. 27

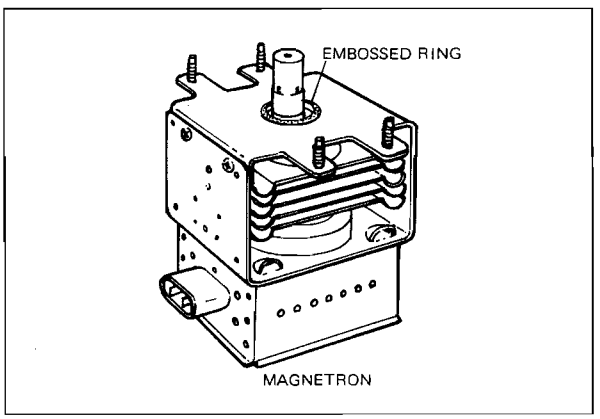


Fig. 28

3. Replacement of the fan motor assembly.

(A) Remove the variable power switch and the high voltage capacitor.

(B) Remove the rubber belt from pulley C and put it on the base with the other end of belt being caught on pulley D.

(C) Remove 5 screws holding fan motor bracket. (See figure 29 & 30)

(D) Pull the fan motor with the bracket and gear box toward you.

(E) Remove the belt A from fan motor's pulley.

(F) Remove three screws holding the fan motor assembly. (See figure 31)

(G) Remove the wire pin to remove pulley.

NOTE: When installing pulley A to the shaft of the fan motor, pulley A should be positioned over the hole on the shaft end so the wire pin can be inserted to hold the pulley onto the shaft. Otherwise the belt may be detached from the pulley while operating.

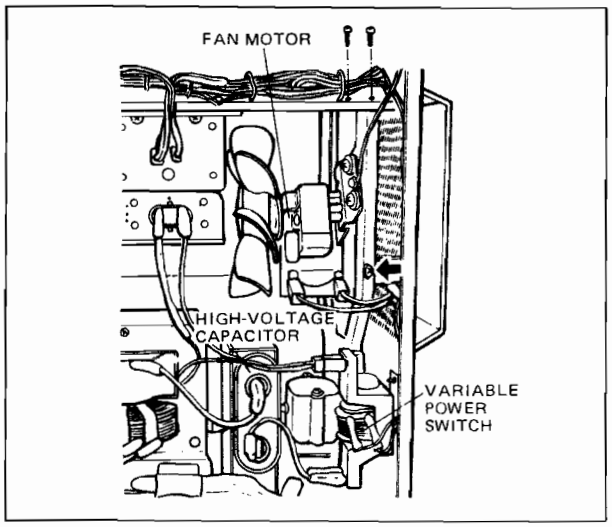


Fig. 29

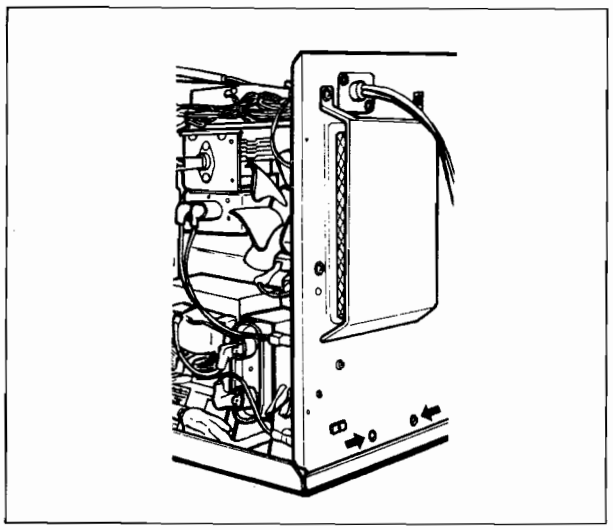


Fig. 30

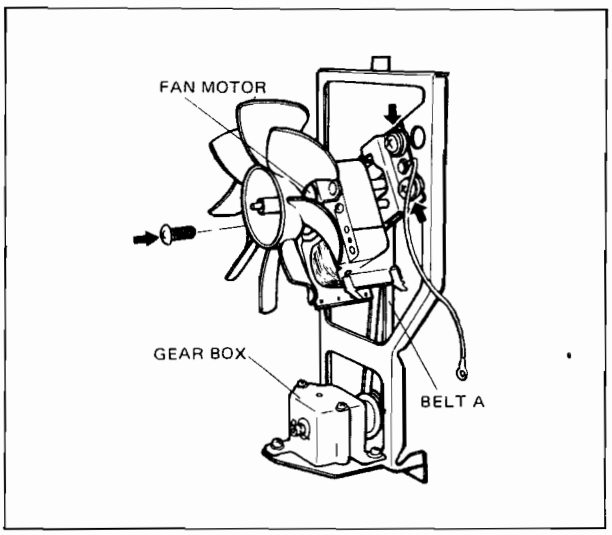


Fig. 31

4. Replacement of the cook timer

(A) Disconnect all wiring connectors connected to escutcheon base.
(B) Remove 4 screws holding escutcheon base assembly to oven chassis
(C) Remove 6 screws to remove the timer bracket with cook timer and printed circuit board.
(D) Remove 3 screws holding cook timer.
(E) When installing cook timer, follow above procedure in reverse,
And adjust the cook timer-zero point so that the shaft pin of cook timer should take the direction of bottom point of triangle hole when the cook switch contacts open. (See fig. 33)
The click can be heard when the contacts open.

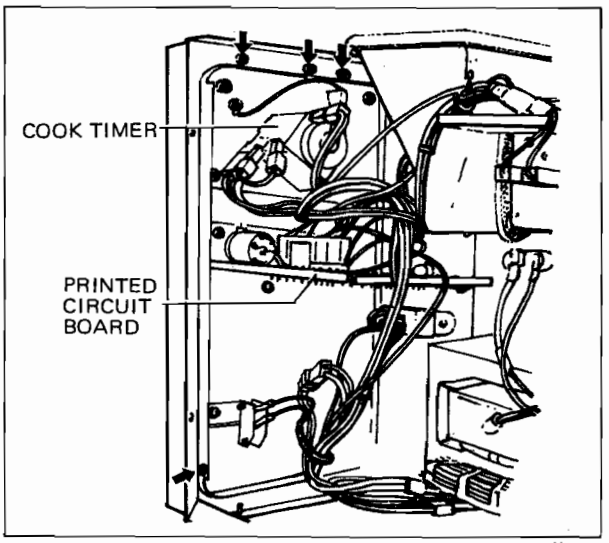


Fig. 32

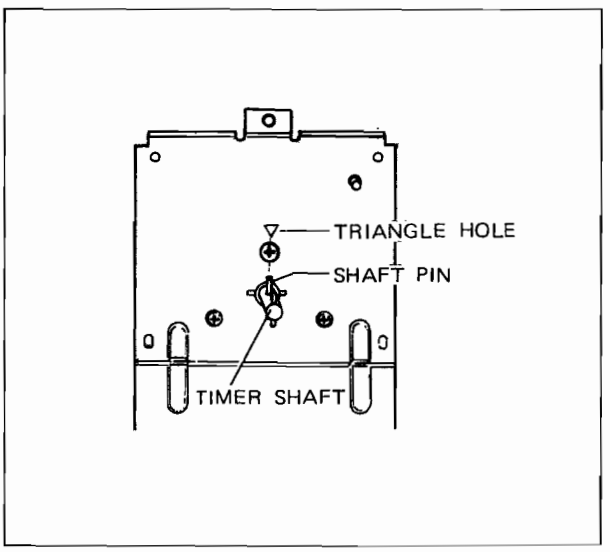


Fig. 33

5. High voltage circuit wiring

Two types of high voltage diodes will be used in the high voltage wiring. These wirings are shown in the figures below.

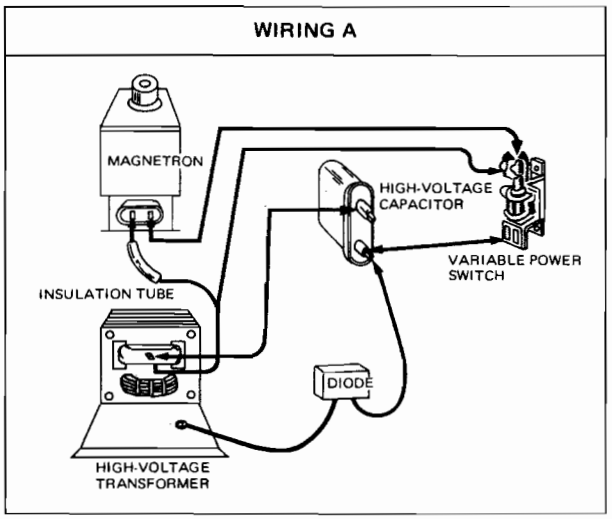


Fig. 34

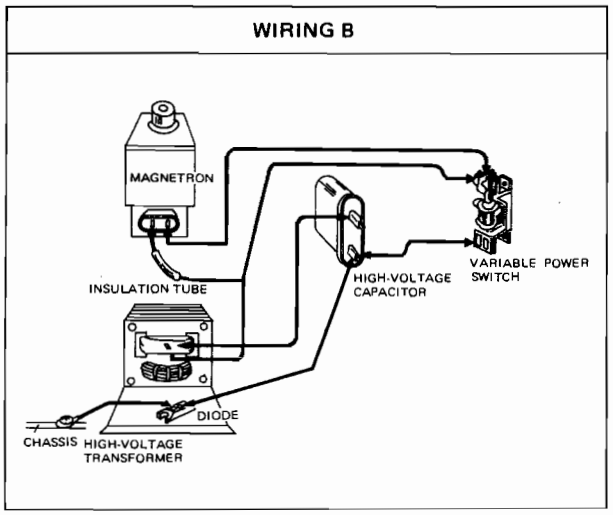


Fig. 35

When ordering a diode (ANE6202-C90), you will receive either an A type or B type diode for your order. So if you receive a different type from the defective one, change the high voltage wiring as shown in above figures.

6. Replacement of the door assembly.

(A) Remove the 4 bolts holding the upper hinge and lower hinge to the oven assembly.

(B) Open the door and while pulling the door toward you, work the upper hinge out through the hole in the oven assembly.
The door will be simply lifted off the bottom hinge pin at the same time.

(C) When mounting the door assembly to the oven assembly, be sure to adjust the door assembly parallel to the sash by moving the upper hinge and lower hinge according to the directions in fig. 36. Also adjust so that the door has no play between the inner door surface and oven frame assembly. If the door assembly is not mounted properly, microwaves may leak from the clearance between the door and the oven.

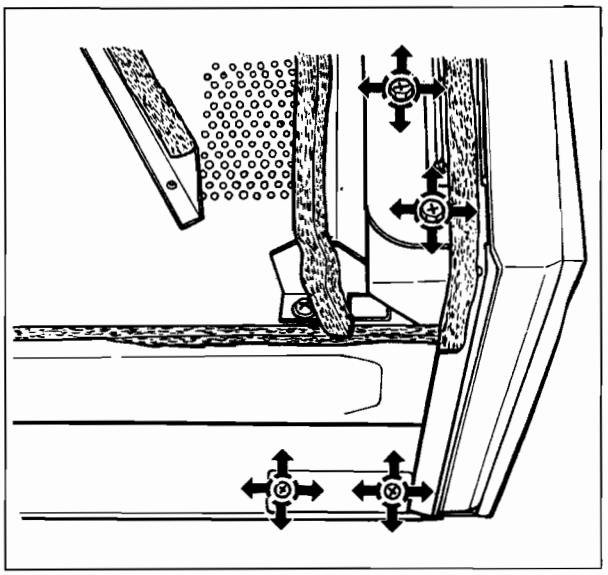


Fig. 36

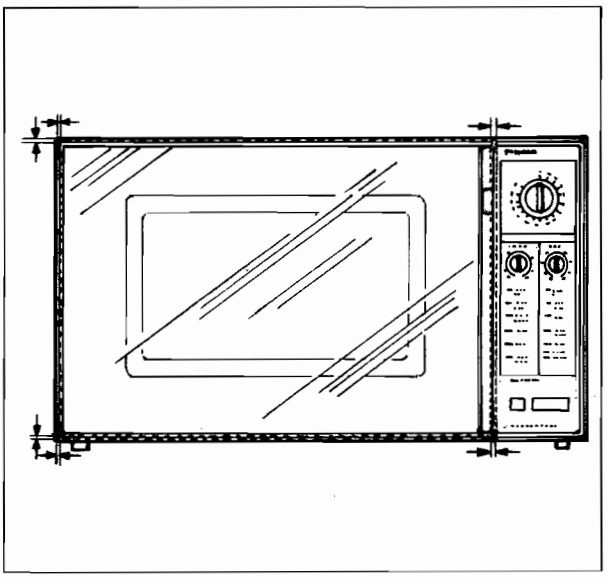


Fig. 37

MEASUREMENT AND ADJUSTMENT

NOTE: Please note this model has no test resistor for measuring diode or anode current. When you check the high voltage circuit, follow the procedure in the troubleshooting guide on page 26.

WARNING

FOR CONTINUED PROTECTION AGAINST RADIATION HAZARD, REPLACE ONLY WITH IDENTICAL REPLACEMENT PARTS (PART NO. ANE6142-780, TYPE NO.V-15-3C28 FOR LATCH SWITCH A AND B AND PART NO. ANE6158 B60AP, TYPE NO. V-5-3C244 FOR SHORT SWITCH).

WHEN THE 15 AMP FUSE IS BLOWN DUE TO THE OPERATION OF SHORT SWITCH, YOU MUST REPLACE LATCH SWITCH A, LATCH SWITCH B AND SHORT SWITCH THEN FOLLOW THE ADJUSTMENT PROCEDURES BELOW.

1. Adjustment of latch switch A (primary)

(A) Mounting of the latch switch to the door hook
Mount latch switch A to the door hook assembly by securing screws as shown in Fig. 38 and 39.

NOTE: No specific adjustment during installation of latch switch A to the door hook is necessary.

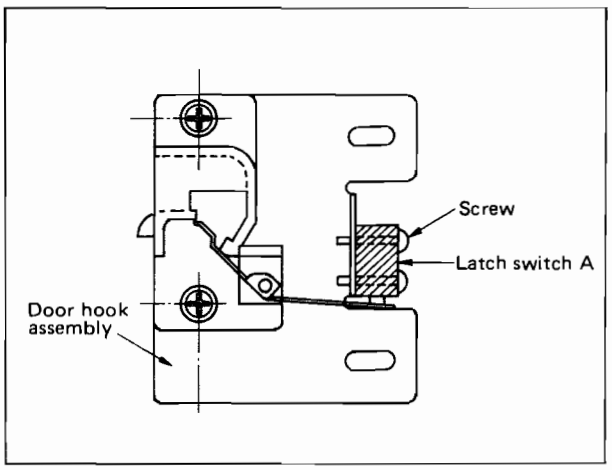


Fig. 38

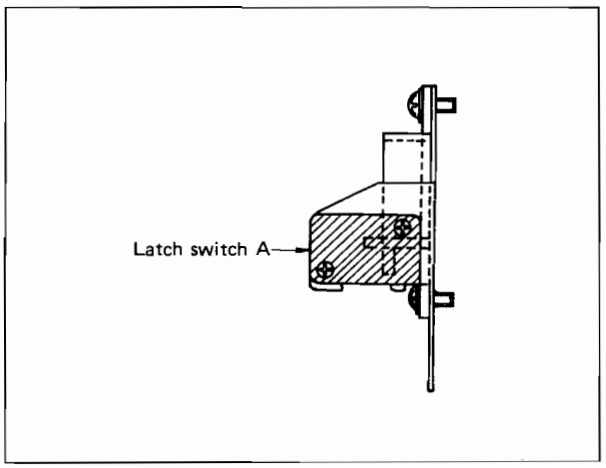


Fig. 39

(B) Installation of the door hook assembly to the oven assembly.
When mounting the door hook assembly to the oven assembly, be sure to asjust the door hook assembly by moving in the arrow direction so that the oven door will not have any play in it.
Check for play in the door by pulling on the door handle without pushing the handle's latch button. Make sure that the latch key positions correctly during adjustment. Also make sure that the latch key moves smoothly after adjustment is completed. Completely tighten the screws holding the door hook assembly to the oven assembly.

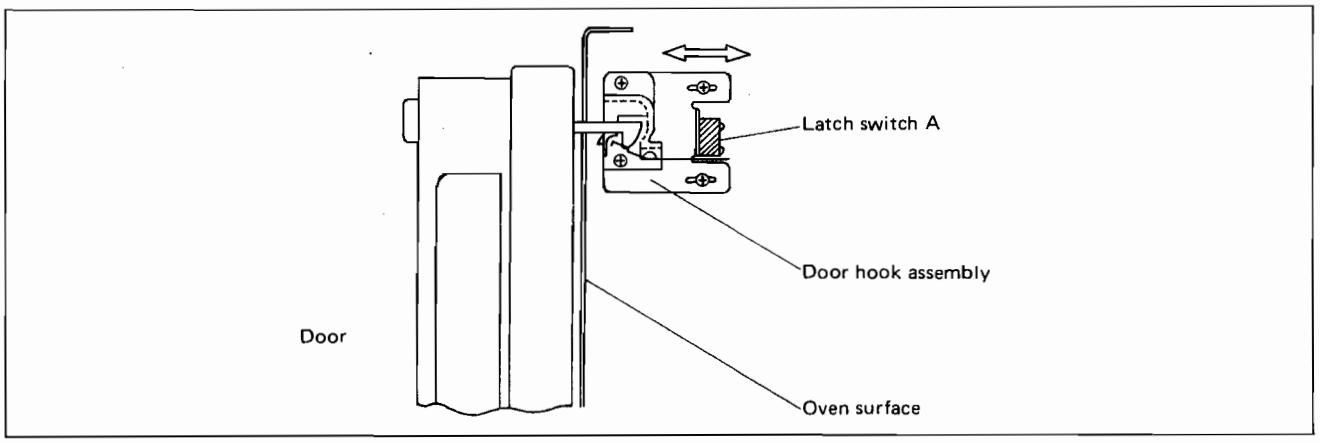


Fig. 40

2. Adjustment of latch switch B (secondary), short switch and oven lamp switch

(A) Mounting of latch switch B, short switch and oven lamp switch to the door hook.
Latch switch B, short switch and oven lamp switch are installed onto the door hook assembly as shown in fig.41.

NOTE: No specific adjustment during installation of latch switch B, short switch and oven lamp switch to the door hook is necessary.

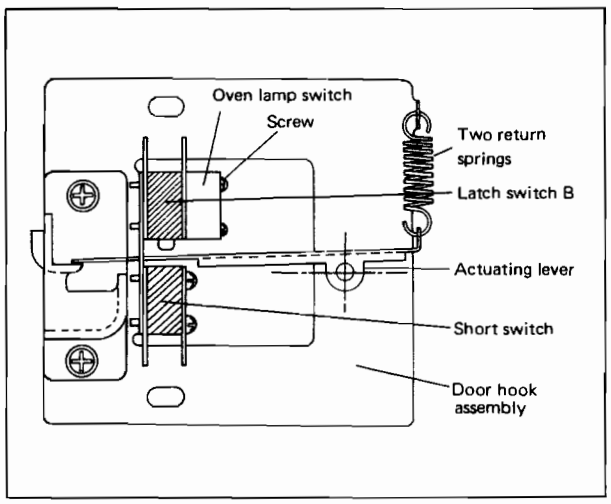


Fig. 41

(B) Installation of the door hook assembly to the oven assembly.
Adjust the door hook by moving it in the direction of the arrow in fig.42, so that the oven door will not have any play in it. Check for play in the door by pulling on the door handle without pushing the handle's latch button. Make sure that the latch key moves smoothly after adjustment is completed.
Completely tighten the screws holding the door hook assembly to the oven assembly.

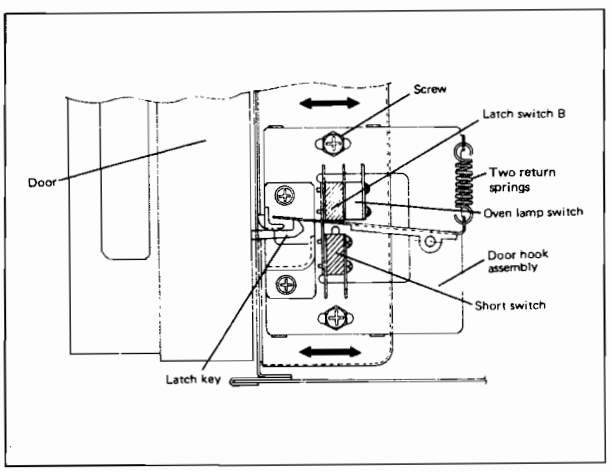


Fig. 42

3. Measurement of the magnetron's output

The power output of the magnetron can be measured by performing a simple water temperature rise test.
Equipment needed for the Test:
* Two 1 liter beakers
* One glass thermometer
* Stopwatch

NOTE: Check the line voltage under load. Low voltage will lower the magnetron output. Make all temperature and time tests with accurate equipment.

(A) Fill the two 1 liter beakers with water and mark one A and one B.
(B) Stir the water in each beaker with the thermometer and record each beaker's temperature.
Beaker A's temperature = T1A
Beaker B's temperature = T1B
The average value (T1) of T1A and T1B is calculated as follows:

$$T1 = \frac{T1A + T1B}{2}$$

(D) Place both beakers on the center of the glass cook plate.
Set the oven for High power and set two minutes. Heat the water for exactly two minutes.
(E) When the heating is finished, again stir the water with the thermometer and measure the temperature rises as T2A and T2B.
(F) The average value (T2) of T2A and T2B is calculated as follows:

$$T2 = \frac{T2A + T2B}{2}$$

(G) Subtract T1 from T2. This will give you the temperature rise.
(H) The normal temperature rise for this model is 16° to 20°F (8.9 to 11°C) at the "High" power selection.
*If no temperature rise is noted, refer to the "TROUBLESHOOTING GUIDE"

4. Temperature test procedure for the sensor system components

After replacement of any sensor system components such as the sensor probe or the printed circuit board, take the temperature test according to the following procedures in order to make sure that the temperature sensor system components are in order.
(A) Set timer to "OFF".
(B) Pour 300 cc (10 ozs) of water in a beaker and place the beaker in the center of the oven with the sensor probe connected and inserted in the water.
(C) Set "High" power.
(D) Set temperature select control to 160°F and press start button.
(E) When the beep sounds, measure the water temperature by placing a thermometer in the cup right next to the probe. In this manner they will both sense the same exact temperature. The allowable temperature range is 160°F±11°F.

PROCEDURE FOR MEASURING RADIATION LEAKAGE

WARNING

CHECK FOR RADIATION LEAKAGE AFTER EVERY SERVICING. SHOULD THE LEAKAGE BE MORE THAN 2 mW/cm^2 (1mW/cm^2 FOR CANADA) INFORM THE PANASONIC CO. (MECA, PHI OR MELCA) IMMEDIATELY. AFTER REPAIRING OR REPLACING ANY RADIATION SAFETY DEVICE, KEEP A WRITTEN RECORD FOR FUTURE REFERENCE, AS REQUIRED BY HEW AND NHW REGULATION. THIS REQUIREMENT MUST BE STRICTLY OBSERVED. IN ADDITION THE LEAKAGE READING MUST BE RECORDED ON THE SERVICE REPAIR TICKET WHILE IN THE CUSTOMER'S HOME.

NOTE: The U.S. government standard is 5 mW/cm^2 while in the customer's home. 2 mW/cm^2 stated here is Panasonic's own voluntary standard.

1. Equipment

* Electromagnetic radiation monitor
* Glass thermometer 100°C or 212°F
* 600cc glass beaker

2. Procedure for measuring radiation leakage

(A) Pour 275 ± 15cc (9 ozs ± 1/2 oz) of 20 ± 5°C (68 ± 9°F) (50cc for Canada) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.

(B) Set the radiation monitor to 2450 MHz and use it following the manufacturer's recommended test procedure to assure correct results.

(C) When measuring the leakage, always use the 2 inch (5 cm) spacer supplied with the probe.

(D) Press the start button and with the magnetron oscillating, measure the leakage by using an electromagnetic radiation monitor by holding the probe perpendicular to the surface being measured.

(1) Measurement with the outer panel removed.

Whenever you replace the magnetron, measure for radiation leakage before the outer panel is installed and after all necessary components are replaced or adjusted.

Special care should be taken in measuring around the magnetron. (Fig.43)

WARNING

AVOID CONTACTING ANY HIGH VOLTAGE PARTS.

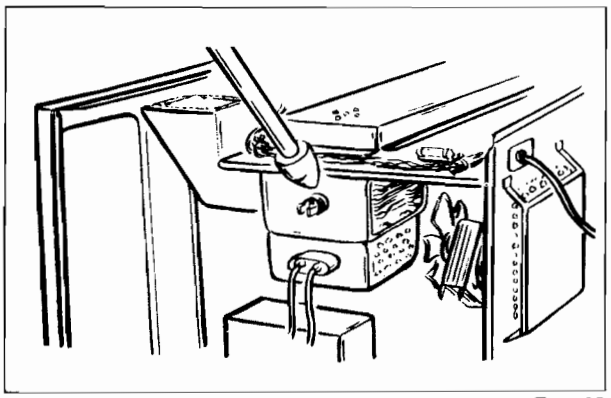


Fig. 43

(2) Measurements with a fully assembled oven.

After all components, including the outer panel, are fully assembled, measure for radiation leakage around the door periphery, the door viewing window, the exhaust opening and air inlet openings.

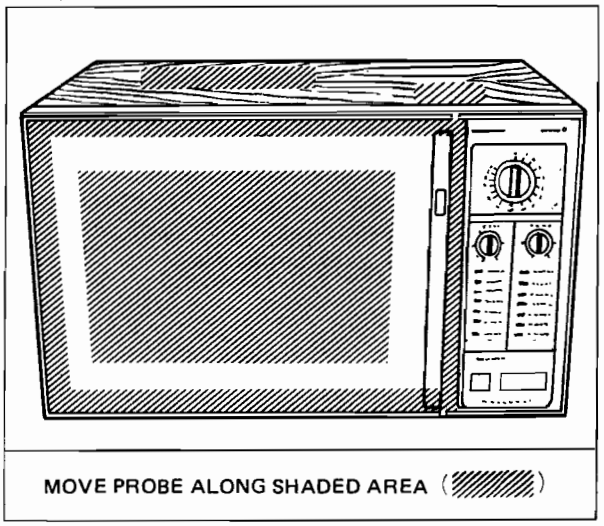


Fig. 44

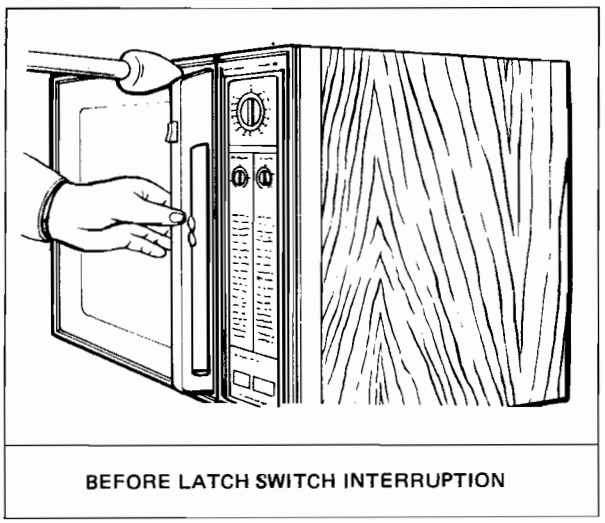


Fig. 45

(E) Radiation leakage must not exceed the values prescribed below.

NOTE 1. **Leakage with the outer panel removed.....less than 5 mW/cm^2**
2. **Leakage for a fully assembled oven with door normally closed ..... less than 2mW/cm^2 (1mW/cm^2 for Canada)**
3. **Leakage for a fully assembled oven [Before the latch switch (primary) is interrupted] with door pulled to outward.....less than 2mW/cm^2**

3. Note when measuring

(A) Do not exceed meter full scale deflection.
(B) The test probe must be moved no faster than 1 inch/sec (2.5 cm/sec) along the shaded area, otherwise a false reading may result.
(C) The test probe must be held with the grip portion of the handle. A false reading may result if the operator's hand is between the handle and the probe.
(D) When testing near a corner of the door, keep the probe perpendicular to the surface making sure the probe end at the base of the cone does not get closer than 2 inches (5cm) from any metal. If it does, erroneous readings may result.
(E) When high leakage is suspected, do not move the probe horizontally along the oven surface, this may possibly cause probe damage.

4. Record keeping and notification after measurement

(A) After adjustment and repair of any radiation interrupting or radiation blocking device, make a repair report, record the measured values and keep the data.
(B) Should the radiation leakage be more than 2 mW/cm^2 (1mW/cm^2 for Canada) after determining that all parts are in good condition, functioning properly, and genuine replacement parts as listed in this manual have been used, immediately notify the PANASONIC Co. (MECA, PHI or MELCA).

5. At least once a year, have the radiation monitor checked for calibration by its manufacturer

CUSTOMER COMPLAINTS NOT RELATED TO OVEN FAILURE

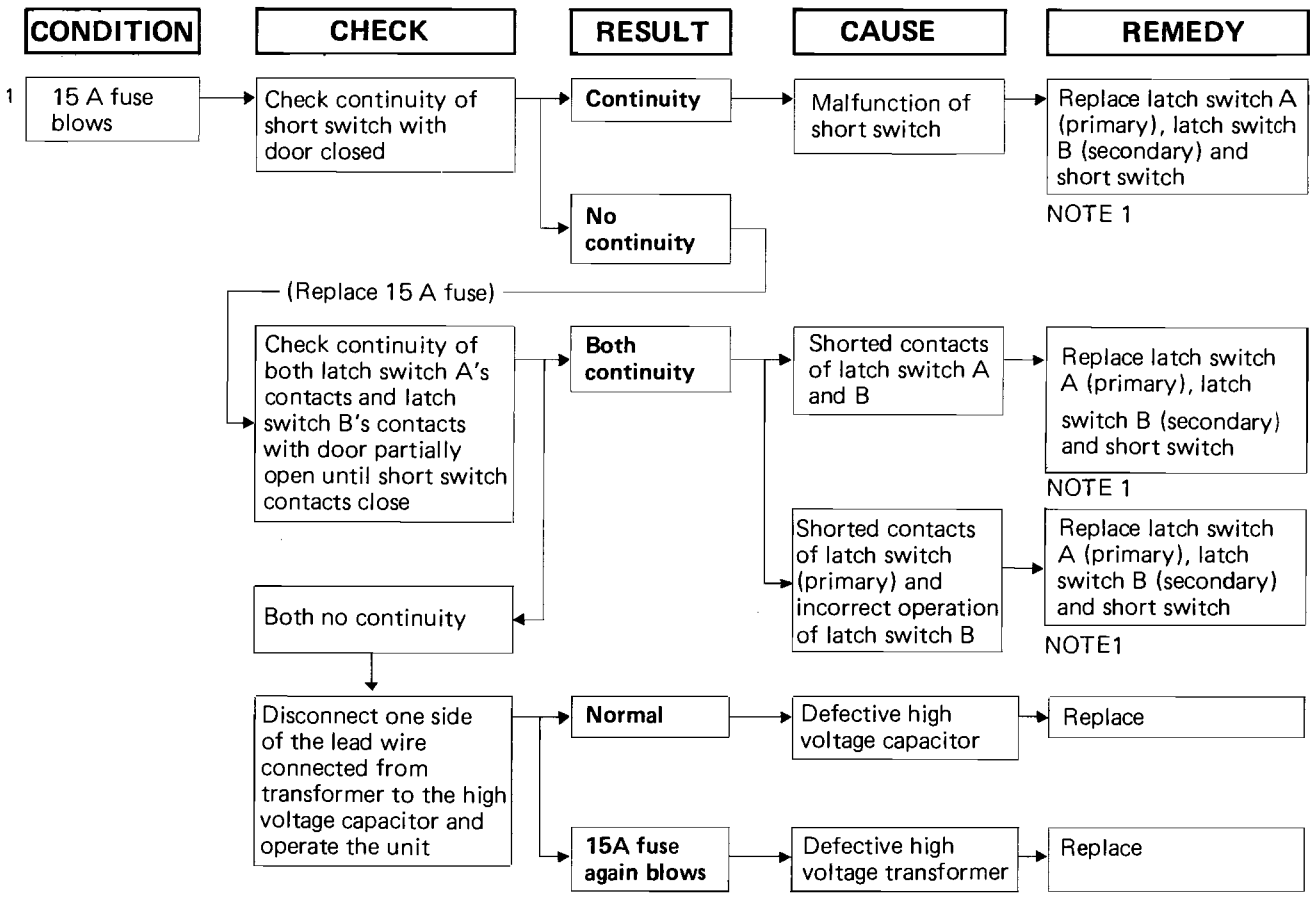
When you get a complaint from your customer, please investigate the complaint carefully before going to the customer's home. If the following symptoms apply, please educate the customer in the proper use of the microwave oven in order to eliminate an unnecessary call.

CONDITION	CAUSE	REMEDY
Microwave oven does not work	Inserting many plugs into one plug receptacle and using them at the same time (causes overloading)	Avoid using other electrical appliances when you use the microwave oven
	Microwave oven plug is not inserted tightly	Insert microwave oven plug tightly
Output power is too low	Low power voltage	Use the microwave oven at adequate electrical power
	Food temperature is too low	This is not, in reality a problem, therefore plese expect to cock a little longer
Sparks occuring	Using metallic ware and allowing it to touch the oven wall	Do not use metallic ware for cooking except where noted in the cook book.
	Ceramic ware trimmed in gold or silver powder is used	Do not use any type of cookware with metallic trimming
Uneven cooking	Inconsistent intensity of microwave by its characteristics	1. Wrap the thinner part with aluminum foil 2. Use plastic wrap or cover with a lid 3. Stir once or twice while cooking such as soup, cocoa or milk.

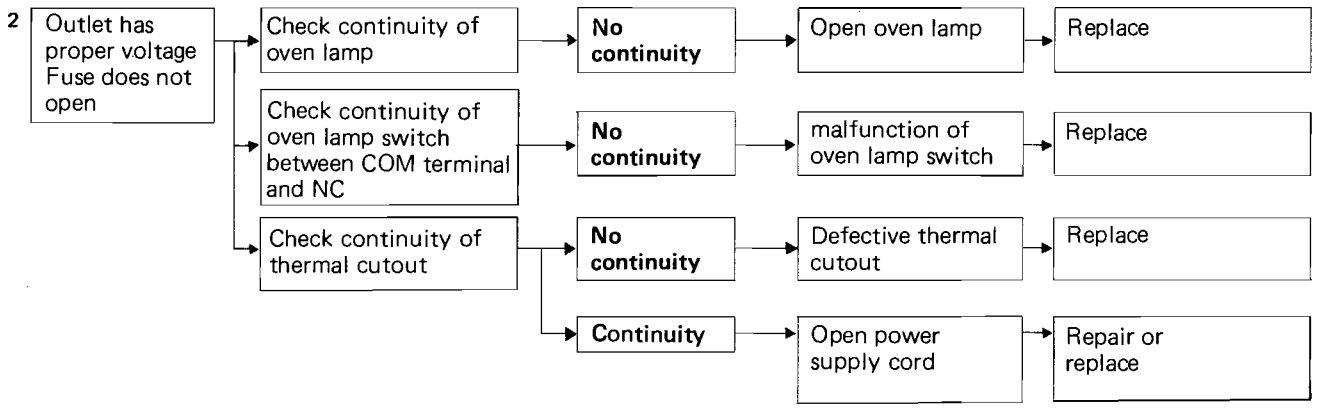
TROUBLESHOOTING GUIDE

1. Check grounding before checking for trouble.
2. Be careful of the high voltage circuit.
3. Discharge the high voltage capacitor (see page 17)
4. When checking the continuity of the switches of transformer, disconnect one lead wire from these parts and then check continuity with the AC plug removed. To do otherwise may result in a false reading or damage to your meter.

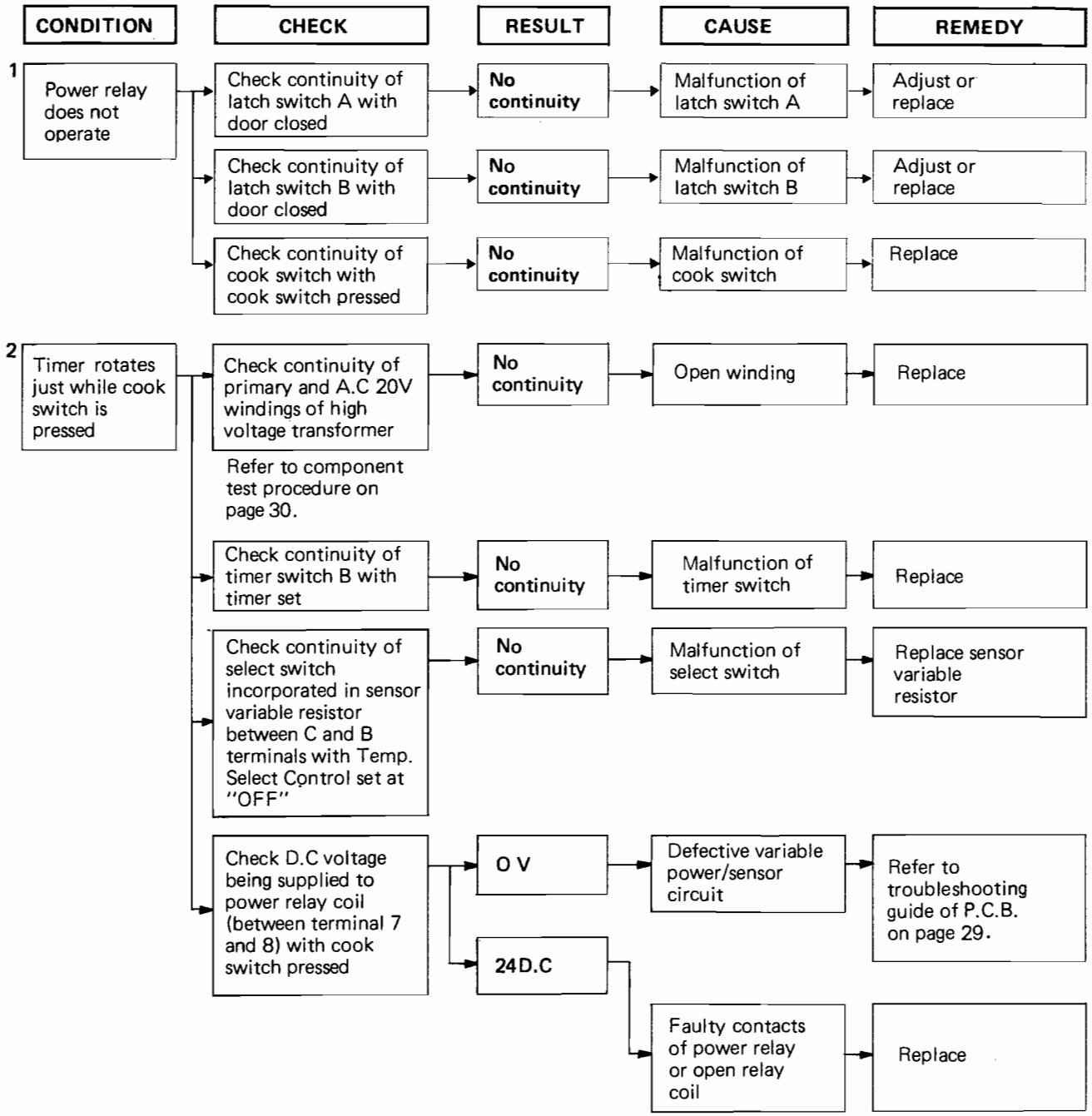
[TROUBLE 1] Oven lamp does not go on when door is opened.


CONDITION
CHECK
RESULT
CAUSE
REMEDY
1
15 A fuse blows
Check continuity of short switch with door closed
Continuity
Malfunction of short switch
Replace latch switch A (primary), latch switch B (secondary) and short switch
NOTE 1
No continuity
(Replace 15 A fuse)
Check continuity of both latch switch A's contacts and latch switch B's contacts with door partially open until short switch contacts close
Both continuity
Shorted contacts of latch switch A and B
Replace latch switch A (primary), latch switch B (secondary) and short switch
NOTE 1
Shorted contacts of latch switch (primary) and incorrect operation of latch switch B
Replace latch switch A (primary), latch switch B (secondary) and short switch
NOTE1
Both no continuity
Disconnect one side of the lead wire connected from transformer to the high voltage capacitor and operate the unit
Normal
Defective high voltage capacitor
Replace
15A fuse again blows
Defective high voltage transformer
Replace

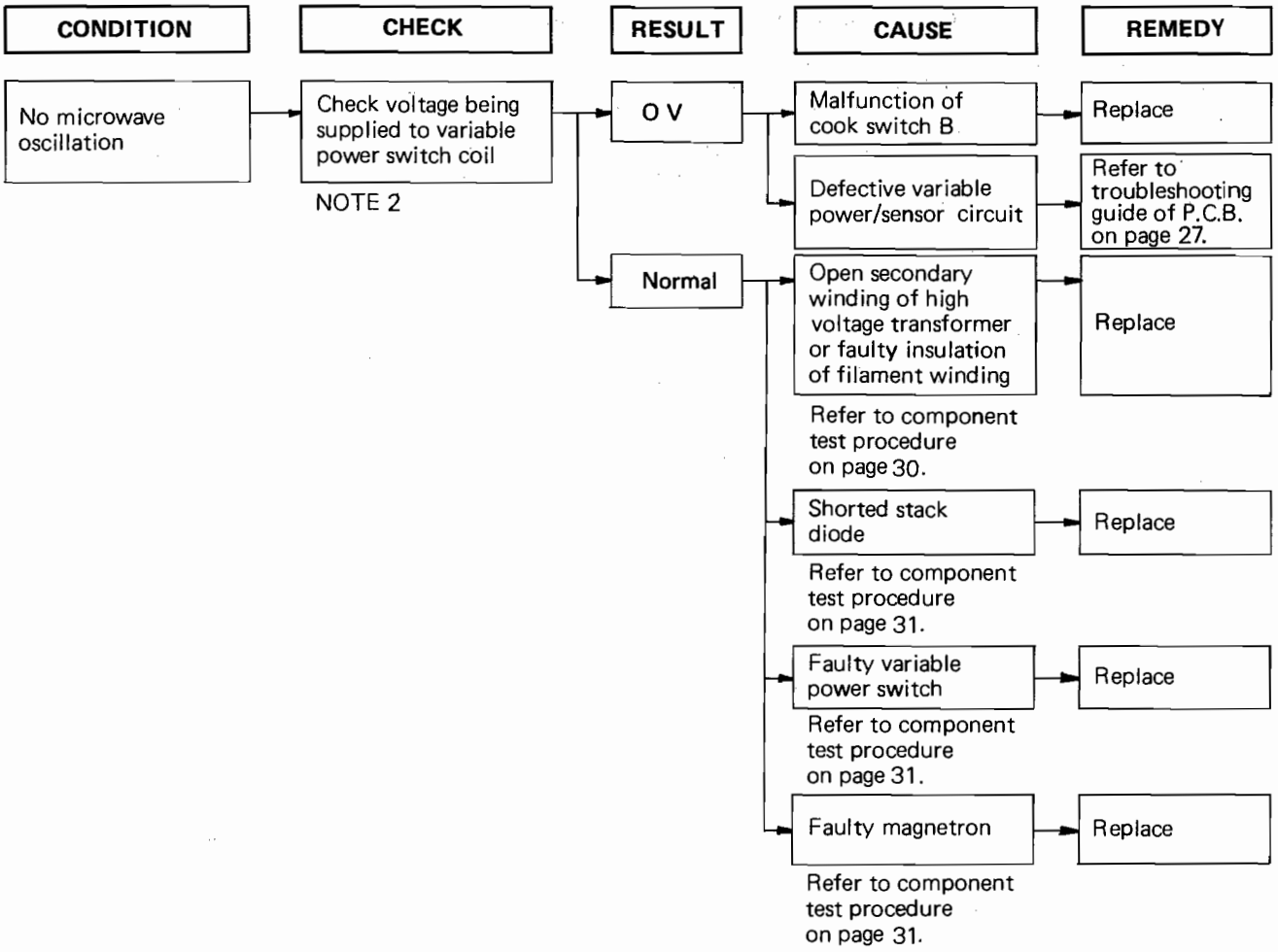
NOTE1: All these switches must be replaced at the same time, please refer to pages 21 & 22 for adjustment instructions.



[TROUBLE 2] **Oven does not start even though the cook timer is set, temperature select control is set at "OFF" and cook switch is pressed.**
(Fan motor and turntable do not rotate and cook indicator lamp does not illuminate while cook button is pressed. This is normal.)

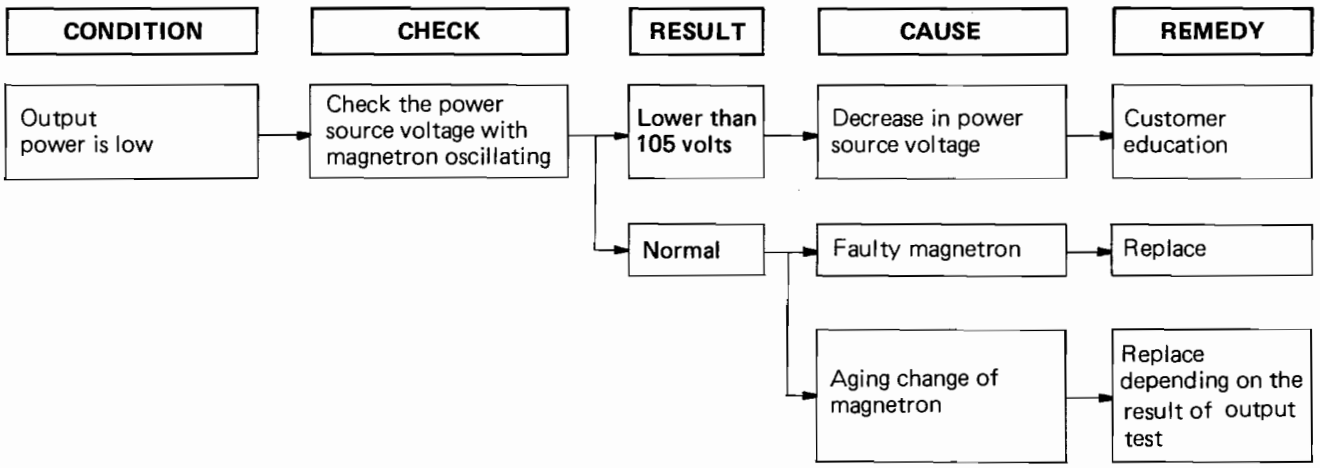

CONDITION
CHECK
RESULT
CAUSE
REMEDY
1
Power relay does not operate
Check continuity of latch switch A with door closed
No continuity
Malfunction of latch switch A
Adjust or replace
Check continuity of latch switch B with door closed
No continuity
Malfunction of latch switch B
Adjust or replace
Check continuity of cook switch with cook switch pressed
No continuity
Malfunction of cook switch
Replace
2
Timer rotates just while cook switch is pressed
Check continuity of primary and A.C 20V windings of high voltage transformer
No continuity
Open winding
Replace
Refer to component test procedure on page 30.
Check continuity of timer switch B with timer set
No continuity
Malfunction of timer switch
Replace
Check continuity of select switch incorporated in sensor variable resistor between C and B terminals with Temp. Select Control set at "OFF"
No continuity
Malfunction of select switch
Replace sensor variable resistor
Check D.C voltage being supplied to power relay coil (between terminal 7 and 8) with cook switch pressed
0 V
Defective variable power/sensor circuit
Refer to troubleshooting guide of P.C.B. on page 29.
24D.C
Faulty contacts of power relay or open relay coil
Replace

[TROUBLE 3] **Oven does not cook at all even though cook indicator lamp goes on. (No microwave oscillation.)**



NOTE2: Disconnect two lead wires connected to variable power switch coil. Set time and set power at "High" power. Normal variable power circuit should read approx. 24 V D.C. continuously.

[TROUBLE 4] **Output power is low. First of all, check if output power is really low following "measurement of magnetron's output" on page 22.**



TROUBLESHOOTING GUIDE OF VARIABLE POWER AND SENSOR CIRCUIT

[TROUBLE 1] No microwaves are oscillated at any power selection though cook indicator lamp goes on.

PART	SYMBOL	TROUBLE
Transistor	Q5	Open
Transistor	Q6	Open
Diode	D1	Short or Open
Diode	D2	Short
Capacitor	C3	Short
Capacitor	C4	Short
Fuse (0.8A)	F1(0.8A)	Melt (Open)

[TROUBLE 2] Microwave oven oscillates only when the power is set at "High".

PART	SYMBOL	TROUBLE
Programable Unijunction Transistor	Q4	Open
Capacitor	C5	Short
Variable Power Resistor	VR1	Open

[TROUBLE 3] Variable power control does not function, in other words full power oscillates at any power selection.

PART	SYMBOL	TROUBLE
Programable Unijunction Transistor	Q3	Short or Open
Programable Unijunction Transistor	Q4	Short
Transistor	Q5	Short
Transistor	Q6	Short
Capacitor	C5	Open
High power switch (NOTE)	SW1	Short

NOTE: The High power switch is incorporated in the variable power resistor (VR1)

[TROUBLE 4] Oven does not start with temperature cooking set though cook switch is pressed.

PART	SYMBOL	TROUBLE
Thermistor (NOTE)	Th	Short or Open
Transistor	Q7	Open
Transistor	Q8	Short
Transistor	Q9	Open
Transistor	Q10	Short
Transistor	Q11	Open
Diode	D1	Open
Diode	D3	Short
Zener Diode	ZD1	Short
Capacitor	C6	Short
Capacitor	C13	Short
Sensor Variable Resistor	VR2	Open

NOTE: The thermistor is incorporated in the sensor probe.

[TROUBLE 5] The oven does not stop at the pre-set temperature when cooking with temperature sensor probe.

PART	SYMBOL	TROUBLE
Transistor	Q8	Open
Transistor	Q9	Short
Transistor	Q10	Open
Transistor	Q11	Short
Capacitor	C7	Short

[TROUBLE 6] Excessive radio interference with T.V. or radio at any power selection except for "High" power position.

PART	SYMBOL	TROUBLE
Programable Unijunction Transistor	Q1	Short or Open
Transistor	Q2	Short or Open
Diode	D4	Short or Open
Capacitor	C1	Short or Open
Capacitor	C2	Short

[TROUBLE 7] Beep sound circuit does not operate normally, namely Buzzer does not sound when cooking is finished or buzzer keeps sounding.

PART	SYMBOL	TROUBLE
IC	μPC177C	Defective
Diode	D5	Open
Diode	D6	Short or Open
Diode	D7	Open
Diode	D8	Short or Open
Zener Diode	ZD2	Short
Capacitor	C9	Short or Open
Capacitor	C10	Short or Open
Capacitor	C11	Short or Open
Capacitor	C12	Short or Open
Buzzer	Bz	Defective

COMPONENT TEST PROCEDURE

1. High voltage is present at the high voltage terminal of the high voltage transformer during any cook cycle.
2. It is neither necessary nor advisable to attempt measurement of the high voltage.
3. Before touching any oven components, or wiring, always unplug the oven from its power source and discharge the capacitor (See page 17)

1. High voltage transformer (refer to Fig.46)

(A) Remove connections from the transformer terminals and check continuity.
(B) Normal readings should be follows:

Secondary winding . . . . . .Approx. 50Ω~70Ω
Filament winding . . . . . .Approx. 0Ω
Primary winding . . . . . .Approx. 0Ω
Digital programmer winding .Approx. 0Ω

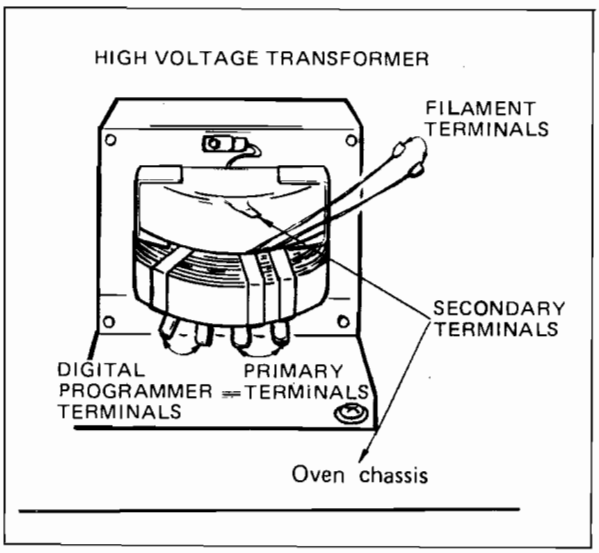


Fig. 46

2. High voltage capacitor

(A) Check continuity of capacitor with meter on highest OHM scale.
(B) A normal capacitor will show continuity for a short time, and then indicate 9MΩ once the capacitor is charged.
(C) A shorted capacitor will show continuous continuity.
(D) An open capacitor will show constant 9 MΩ.
(E) Resistance between each terminal and chassis should be infinite.

3. Diode

The diode is located on the base near the transformer.

(A) Isolate the diode from the circuit by disconnecting the leads.
(B) With the ohmmeter set on the highest resistance scale, measure the resistance across the diode terminals. Reverse the meter leads and again observe the resistance reading. Meter with 6V, 9V or higher voltage batteries should be used to check the front-to-back resistance of the diode, otherwise an infinite resistance may be read in both directions. A normal diodes' resistance will be infinite in one direction and several hundred KΩ in the other direction.

4. Magnetron

For complete magnetron diagnosis, refer to "Measurement of the Magnetron's output" (page 22). Continuity checks can only indicate an open filament or a shorted magnetron. To diagnose for an open filament or shorted magnetron.

(A) Isolate magnetron from the circuit by disconnecting the leads.
(B) A continuity check across magnetron filament terminals should indicate one ohm or less.
(C) A continuity check between each filament terminal and magnetron case should read open.

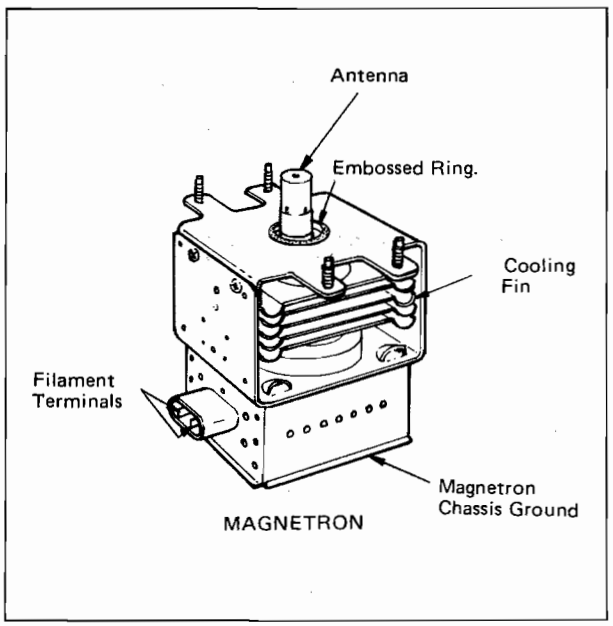


Fig. 47

5. Variable power switch

(A) Isolate the variable power switch from the circuit by disconnecting all leads and check continuity.
(B) A continuity check across the switch coil should be about 200 ohms.
(C) A continuity check between switch terminals should read open.
(D) A continuity check between each switch terminal and ground should read open.
(E) In order to check if the contacts of the variable power switch are operating normally, do the following test procedure.
  1) Be sure to isolate variable power switch from the high voltage circuit by disconnecting all leads except two leads connected to coil terminals from P.C.B.
  2) Now select a power other than "High" and start the oven.
  3) Check the continuity between both switch terminals.
  4) Variable power switch contacts work properly if ohm meter reads open or 0 ohms when click is heard.

BE VERY CAUTIONS OF THE HIGH VOLTAGE.

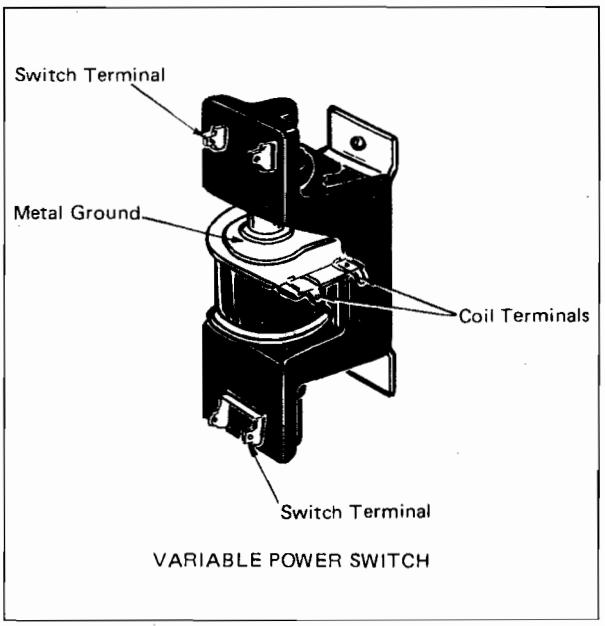
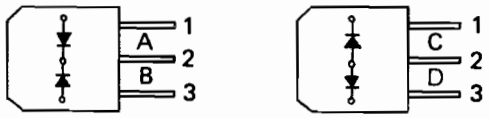


Fig. 48

HOW TO CHECK THE SEMICONDUCTORS USING AN OHM METER

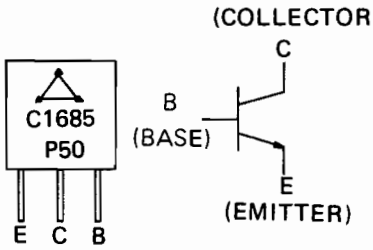
1. DIODE



	FORWARD	REVERSE
A	SMALL	∞
B	SMALL	∞
C	SMALL	∞
D	SMALL	∞

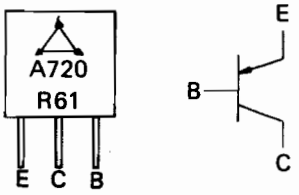
2. TRANSISTOR

NPN Transistor



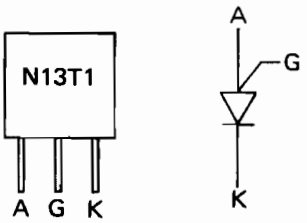
	FORWARD	REVERSE
B-E	SMALL	∞
B-C	SMALL	∞
C-E	∞	∞

PNP Transistor



	FORWARD	REVERSE
E-B	SMALL	∞
C-B	SMALL	∞
C-E	∞	∞

3. PROGRAMABLE UNIJUNCTION TRANSISTOR



	FORWARD	REVERSE
A-G	SMALL	∞
A-K	SMALL	∞
G-K	∞	∞

NECESSARY TOOLS AND MEASURING INSTRUMENTS

1. Necessary tools

Tools normally used for TV servicing are sufficient. Standard tools are listed below.

* Diagonal pliers
* Phillips head screwdriver
* Socket wrench (SIZE 8, 15mm)
* Nutdriver (SIZE 5.5, 7, 8 mm)
* Solder
* Vinyl insulation tape
* Long nose pliers
* Slotted head screwdriver
* Adjustable wrench
* Soldering iron
* Polishing cloth

2. Necessary measuring instruments

* Tester (Volt D.C/A.C – Ohm meter)
* Ruler
* Electromagnetic radiation monitor
* Stop watch
* 600 cc glass beaker or equivalent
* Glass thermometer 100°C or 212°F
* Two 1 liter beakers or equivalent

PARTS LIST

NOTE: Part numbers are indicated on all parts. Please use these Part Numbers for parts orders.

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
1	ANE1001B60AP	Base	1	
2	ANE1026B60AP	Turntable cover A	1	
3	ANE110DG00AP	Outer panel	1	
4	ANE1008-760	Rubber foot	4	
5	ANE1047B60AP	Lower sash	1	
7	ANE2055-850	Cover A	1	
8	ANE290D-860	Roller ring assembly	1	
9	ANE201B-810	Pulley D	1	
10	ANE201KB60AP	Roller A assembly	1	(NOTE 1)
11	ANE201FB60AP	Turntable	1	
16	ANE3273B60AP	Lever pin	1	
17	ANE3081B60AP	Door hinge spacer	1	
18	ANE400YB60AP	Fan motor assembly	1	
19	ANE4111B60AP	Fan motor bracket A	1	
20	ANE4112B60AP	Fan motor bracket B	1	
21	ANE401EB60AP	Air guide A assembly	1	
22	ANE400SB60AP	Air guide C	1	
23	ANE402EB60AP	Air guide D	1	
24	ANE401BB60AP	Exhaust guide B assembly	1	
25	ANE4107C30AQ	Exhaust guide	1	
26	ANE490C-820	Gear box assembly	1	
27	ANE4143-810	Pulley stopper spring	1	
28	ANE4131-810	Pulley A	1	
29	ANE4133B60AP	Pulley C	1	
30	ANE4060B60AP	Belt A	1	
31	ANE4110-860	Belt B	1	
35	ANE6126B60AP	Power relay	1	
39	ANE6481G00AP	Oven lamp switch	1	
40	ANE6145780AC	Thermal cutout	1	For oven
41	ANE6145930AP	Thermal cutout	1	For magnetron
42	ANE6030B60AP	Oven lamp	1	
43	ANE6152B60AP	Oven lamp socket	1	
46	ANE6231770AP	Fuse holder	1	
47	ANE6324-820	Cushion rubber	3	
48	ANE6242B60AP	Latch switch bracket	1	
50	ANE6241B60AP	Latch switch lever	1	
51	ANE6306910AP	Insulation sheet R	7 (TOTAL10)	This is the same part as E12
52	ANE6037G00AP	Capacitor bracket	1	(NOTE4)
53	ANE6037B60AP	Capacitor bracket	1	(NOTE4)
54	ANE6125-780	Thermal cutout bracket	1	
55	ANE910AG00AP	Power supply cord	1	For NE-7720 (NOTE5)
56	ANE900CG00CP	Power supply cord	1	For NE-7720C
57	ANE9027510RN	Cord bushing	1	For NE-7720C
58	ANE9080-730	Clip	2	
60	ANE4120B60CP	Exhaust cover	1	For NE-7720C
62	ANE6040B60AP	Oven lamp sheet	1	
63	ANE6238B60AP	Spacer	1	
64	ANE601KG00AP	Senser jack	1	
65	ANE630MG00AP	Senser cover assembly	1	
66	ANE600DG00AP	Terminal board	1	
67	ANE6243G00AP	Insulation spacer A	2	
68	ANE6247G00AP	Insulation spacer B	1	
69	ANE6246G00AP	Power relay bracket	1	
70	ANE6365910AP	Senser holder	1	

NOTE1: When ordering the roller A assembly, three rollers will be shipped. When replacing the roller, three rollers should be replaced at the same time. Otherwise the turntable may not turn smoothly.

NOTE2: This model has either regular size capacitor or bigger one. Please order correct part number after measuring size of defective one, otherwise the new one does not fit the bracket.

NOTE3: When ordering the diode (ANE6202-C90), you will receive either A type or B type for you order. For wiring information. Please refer to page 37.

NOTE4: This model has either regular size capacitor bracket or bigger one. Please order correct part number after measuring size of defective one, otherwise the new one does not fit the high voltage capacitor.

NOTE5: This contains a cord bushing and a cord stopper.

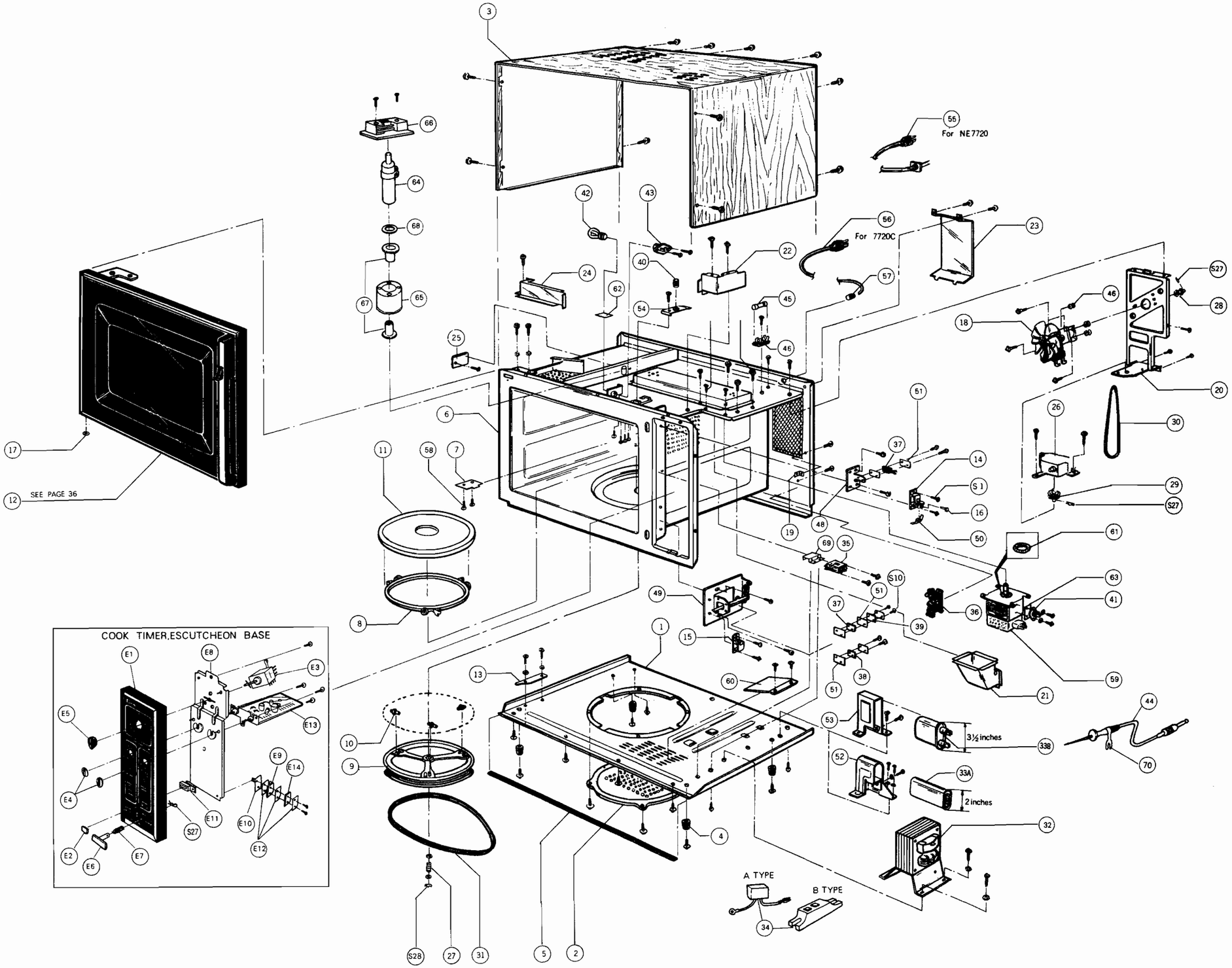
REF.NO. E13 PRINTED CIRCUIT BOARD

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
R1.9.15	ERD25TJ244	240KΩ ±5% ¼W	3	
R2	ERD25TJ470	47Ω ±5% ¼W	1	
R3.4.8.14.25	ERD25TJ104	100KΩ ±5% ¼W	5	
R5	ERD50TJ302	3.0KΩ ±5% ½W	1	
R6	ERD25TJ202	2.0KΩ ±5% ¼W	1	
R7.16	ERD25TJ474	470KΩ ±5% ¼W	2	
R10	ERD25TJ273	27KΩ ±5% ¼W	1	
R11	ERD25TJ471	470Ω ±5% ¼W	1	
R12	ERD25TJ393	39KΩ ±5% ¼W	1	
R13.21.33	ERD25TJ103	10KΩ ±5% ¼W	3	
R17.18	ERD25TJ472	4.7KΩ ±5% ¼W	2	
R19	ERD25TJ223	22KΩ ±5% ¼W	1	
R20	ERD50TJ471	470Ω ±5% ½W	1	
R22	ERD25TJ4221	4.22KΩ ±2% ¼W	1	
R23	ERD25TJ4642	46.4KΩ ±2% ¼W	1	
R24.29.39	ERD25TJ473	47KΩ ±5% ¼W	3	
R26	ERD25TJ203	20KΩ ±5% ¼W	1	
R27.28.31.49	ERD25TJ683	68KΩ ±5% ¼W	4	
R30	ERD25TJ562	5.6KΩ ±5% ¼W	1	
R32	ERD25TJ822	8.2KΩ ±5% ¼W	1	
R34.36.41.45 46.47	ERD25TJ623	62KΩ ±5% ¼W	6	
R35	ERD25TJ304	300KΩ ±5% ¼W	1	
R37.44	ERD25TJ333	33KΩ ±5% ¼W	2	
R38	ERD25TJ274	270KΩ ±5% ¼W	1	
R40	ERD25TJ124	120KΩ ±5% ¼W	1	
R42.43.	ERD25TJ204	200KΩ ±5% ¼W	2	
R48	ERD25TKG1963	196KΩ ±2% ¼W	1	
R50	ERD25TJ102	1.0KΩ ±5% ¼W	1	
R51	ERD25TJ222	2.2KΩ ±5% ¼W	1	
R52.53	ERD50TJ182	1.8KΩ ±5% ½W	2	

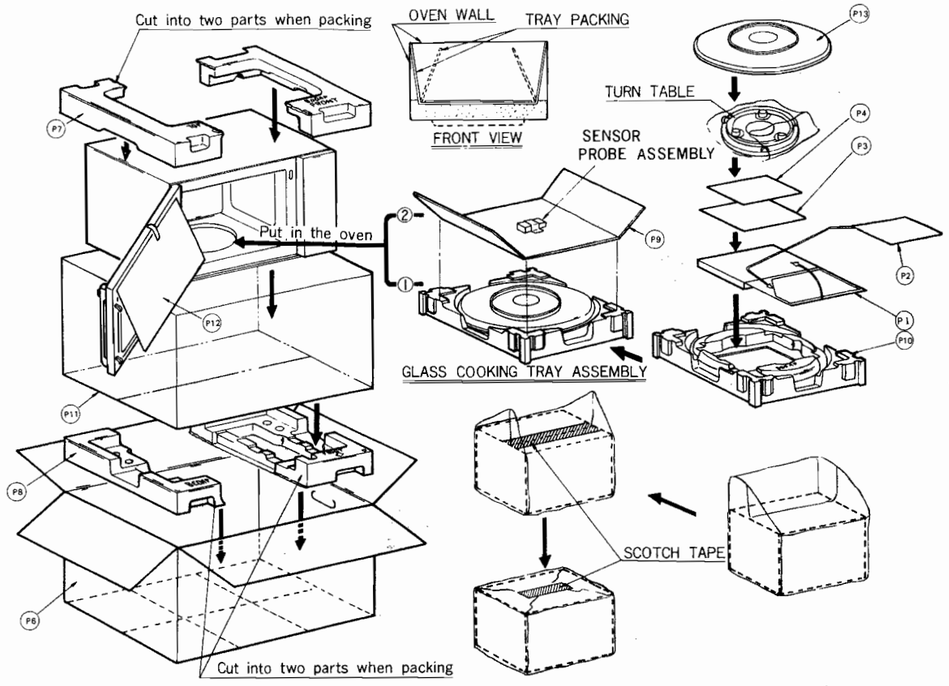
Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
C1.7	ECQM1H104KZB	0.1μF ±10% 50V	2	
C2	ECKW1H472MB2	0.0047μF ±20% 50V	1	
C3.13	ECEA1VS221E	220μ −10%+30% 35V	2	
C4	ECEA1VS100E	10μF −10%+30% 35V	1	
C5	ECEA25GN33ZC	33μF −10%+50% 25V	1	
C6	ECKW1E104-ZFZ	0.1μF −20%+80% 25V	1	
C9	ECEA1ES222E	2200μF −10%+30% 25V	1	
C10	ECEA1AS470E	47μF −10%+30% 10V	1	
C11	ECSF10E4R7	4.7μF ±20% 10V	1	
C12	ECQM1H222KZB	0.0022μF ±10% 50V	1	
D1	ANE6266910AP	Diode	1	
D2.3.4.5.	ANE6265880AP	Diode	4	
D6.7.8	ANE6266970AP	Diode	3	
ZD1.2	ANE6404G00AP	Zener diode	2	
IC	ANE6385G00AP	I.C Quad comparator	1	μPC177C
Q1.3.4	N13T1	Programable unijunction transister	3	
Q2.5.7.8.9.10	2SC945-Q	NPN Transister	6	
Q6.11	2SC1318-Q	NPN Transister	2	
BZ	EFBRD24C03	Buzzer	1	
VR1	EVC3J5053B35	Variable resistor B	1	
VR2	EVC2J9053ABC	Variable resistor A	1	
Fuse	XBA1H08NU100	Fuse 0.8A	1	
CON1	ANE9040G00AP	3Pin connector	1	
CON2	ANE9043G00AP	7Pin connector	1	
Bracket	ANE6394G00AP	Bracket	1	

EXPLODED VIEW

For screws, washer and nut, see page 39.

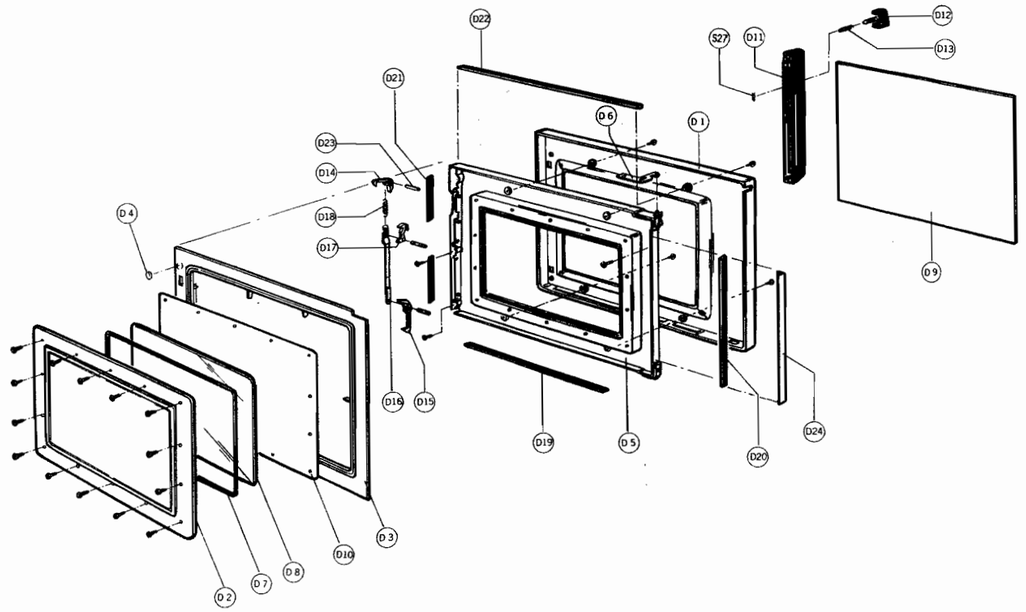


PACKING AND ACCESSORIES

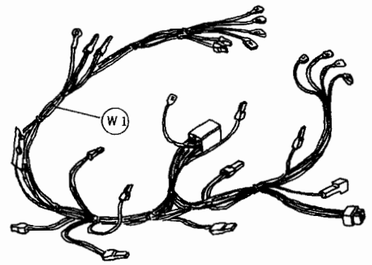


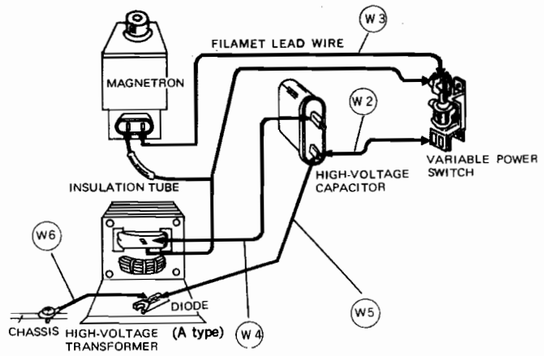
REF. NO. 12 DOOR ASSEMBLY

For screws, washer and nut, see page 39.

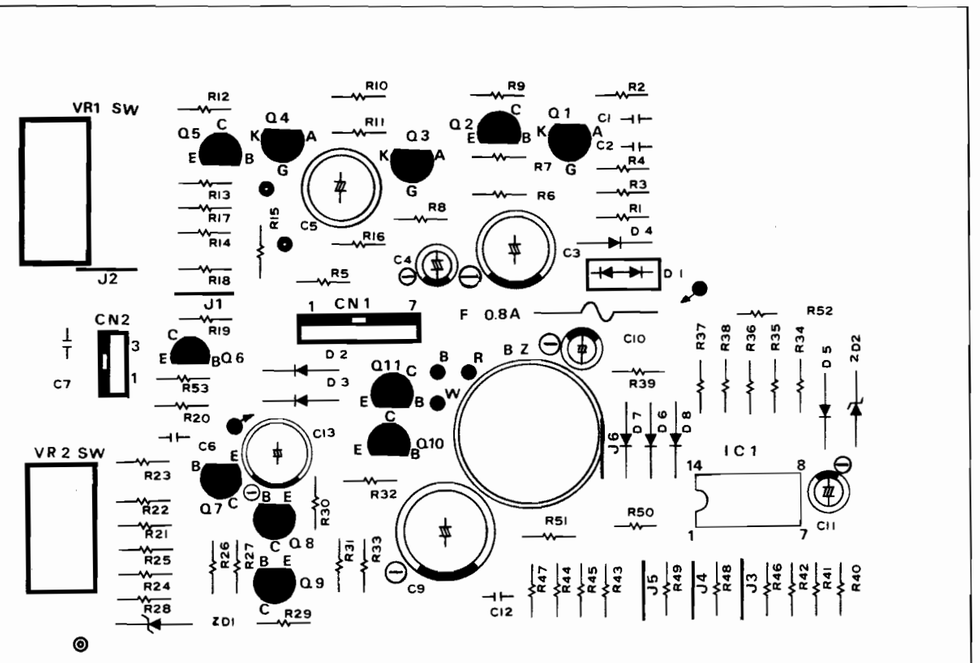


WIRING MATERIAL





REF. NO. E13 PRINTED CIRCUIT BOARD



COOK TIMER ESCUTCHEON BASE

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E1	ANE800LG00AP	Escutcheon base assembly	1	
E2	ANE8007-820	Escutcheon E	1	
E3	ANE6001G00AP	Cook timer	1	
E4	ANE803D-900	Switch knob	2	
E5	ANE800D-810	Cook timer knob	1	
E6	ANE8024-820	Cook button	1	
E7	ANE3243910AP	Cook button spring	1 (TOTAL 2)	This is the same part as D13
E8	ANE8018G00AP	Timer bracket	1	
E9	ANE6160G00AP	Cook switch A	1	
E10	ANE6162G00AP	Cook switch bracket	1	
E11	ANE600M580AP	Cook lamp	1	
E12	ANE6306910AP	Insulation sheet R	3 (TOTAL10)	This is the same part as 51
E13	ANE601DG00AP	Printed circuit board	1	
E14	ANE6493G00AP	Cook switch B	1	

PACKING AND ACCESSORIES

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
P1	ANE000BB60AP	Cook book	1	
P2	ANE0003G00AP	Operating instructions	1	For NE-7720
	ANE0003G00CP	Operating instructions	1	For NE-7720C
P3	ANE0013G00AP	Warranty card	1	For NE-7720
	ANE0013910CP	Warranty card	1	For NE-7720C
P4	ANE0169521AP	Servicenter list	1	For NE-7720
	ANE0169B60CP	Servicenter list	1	For NE-7720C
P6	ANE0102G00AP	Outer case	1	For NE-7720
	ANE0102G00CP	Outer case	1	For NE-7720C
P7.8	ANE010AB60AP	Filler set	1	
P9	ANE0108B60AP	Tray packing	1	
P10	ANE0113B60AP	Tray styrol	1	
P11	ANE0106910AP	Vinyl cover	1	
P12	ANE0107580AP	Door sheet	1	
P13	ANE0601B60AP	Glass cooking tray	1	

WIRING MATERIAL

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
W1	ANE030AG00AP	Lead wire harness	1	
W2	ANE0363-860	Lead wire	1	
W3	ANE0351-770	Lead wire	1	
W4	ANE0351-820	Lead wire	1	
W5	ANE0362G00AP	Lead wire	1	
W6	ANE0363G00AP	Lead wire	1	

REF. NO. 12 DOOR ASSEMBLY

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
D4	ANE3275B60AP	Door C cap	3	
D9	ANE3146B60AP	Door screen B	1	
D11	ANE300RB60AP	Door handle	1	
D12	ANE3147B60AP	Handle latch button	1	
D13	ANE3243910AP	Latch button spring	1 (TOTAL2)	This is the same part as E7
D14	ANE3018B60AP	Door key A	1	
D15	ANE3019B60AP	Door key B	1	
D16	ANE3107B60AP	Door key lever	1	
D17	ANE3139B60AP	Door key lever B	1	
D18	ANE3021B60AP	Door key spring	1	
D23	ANE3056930AP	Handle pin	3	
D24	ANE3183B60AP	Ferrite metal	1	

STANDARD PART

No.	Description	Part No.	Size(mm)	Q'ty	Usage
S1	Screw	XTWANE4+10B	4 x 10	4 1 1 2 2 1 2 2 3 2 2 2 2 3 4 2 2	Door A Door handle A Capacitor bracket Fan motor bracket A Air guide A High voltage capacitor Air guide C Cord stopper Cook timer Air guide D Door hook A Door hook B Exhaust cover Exhaust guide B assembly Fan motor bracket B Oven lamp socket Power relay bracket
S2	Screw	XTWANE4+12E	4 x 12	7 1 1	Outer case Diode Escutcheon base
S3	Screw	XTWANE4+8B	4 x 8	1 2	Thermal cutout bracket Gear box assembly
S4	Screw	XTNANE4+10B	4 x 10	1 1	Fuse holder Cook switch bracket
S5	Screw	XTW4+16B	4 x 16	2	Door handle
S6	Screw	XTN4+16B	4 x 16	3	Escutcheon base
S7	Screw	XTC4+12BFZC	4 x 12	4	Outer panel
S8	Screw	XTWANE4+15B	4 x 15	4	Rubber foot
S9	Screw	XTWANE4+12B	4 x 12	4 8 6 3	Turntable cover A Base Timer bracket Printed circuit board
S10	Screw	XTNANE5+12B	5 x 12	2	High voltage transformer
S11	Screw	XYN3+F18S	3 x 18	2 2	Latch switch A Short switch
S12	Screw	XST35+10VS	3.5 x 10	14	Door B
S13	Screw	XYN3+F30S	3 x 30	2 2	Cook switch Latch switch B
S14	Screw	XYN4+F10S	4 x 10	1	Variable power switch
S15	Screw	XST4+5VS	4 x 5	4	Senser cover B
S16	Screw	XYEANE4+F12S	4 x 12	2 2	Latch switch bracket Latch switch B bracket
S17	Screw	XSNANE4+13	4 x 13	3	Fan motor
S18	Screw	XYEANE5+C12S	5 x 12	2 2	Upper hinge Lower hinge
S19	Screw	XYN3+C18S	3 x 18	2	Terminal board
S20	Screw	XTWANE3+12B	3 x 12	1	Power relay
S21	Screw	XYN4+C6S	4 x 6	2	Thermal cutout (magnetron)
S22	Screw	XYN3+12B	3 x 12	1	Cook lamp
S23	Screw	XTW3+8B	3 x 8	4	Printed circuit board
S24	Nut	XNWANE5ES	M5	4	Magnetron
S25	Washer	XWC5BKX	M5	2 2 2	Upper hinge Lower hinge High voltage transformer
S26	Washer	XWGANE8	M8	2	Pulley D
S27	Wire pine	XPDANE3A19KP	3 x 19	1 1 1 1 2	Cook button Door handle C Pulley A Pulley C Gear box assembly
S28	Wire pin	XPDANE8A28KP	8 x 28	1	Pulley D

MEMO

Printed in Japan